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ASSISTANT EDITOR

P. A. MAPLESTONE, D.S.O., D.Sc., M.B., Ch.B., D.T.M.

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CORRIGENDA

In the November 1939 number of the *Gazette*, p. 686, the article M. & B. 693 in Pneumonia, by W. J. Moody, Capt., I.M.S., should read—

M. & B. 693 IN PNEUMONIA

By W. J. MOODY, M.A., M.B., F.R.C.S. (Edin.),
CAPTAIN, I.M.S.

and on p. 692 the article 'Neuropoietin Principle in Gastric Secretion' by A. N. Shaha should read—

'NEUROPOIETIN PRINCIPLE IN GASTRIC SECRETION'

THE ÆTIOLOGY OF CENTRAL NERVOUS SYMPTOMS IN PERNICIOUS ANÆMIA

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Original Articles

THE ÆTIOLOGY OF TROPICAL MACROCYTIC ANÆMIA

By L. EVERARD NAPIER, M.R.C.P. (Lond.)
*Professor of Tropical Medicine, Calcutta School of
Tropical Medicine*

A NUMBER of papers that have an important bearing on the question of the ætiology of tropical macrocytic anæmia have been published during the last year. In the newer ætiological classification of anæmias (Witts, 1932), which, as far as the macrocytic anæmias are concerned, is dependent on the work of Castle, Wilkinson, Wills and others in America and Great Britain, a very comfortable place has been found for tropical macrocytic anæmia under the heading of 'errors of hæmopoiesis', as a deficiency dyscrasia due to a deficiency, relative or absolute, of Castle's extrinsic factor in the diet. The simplicity of this classification is attractive, and, further, a considerable amount of experimental clinical evidence has been adduced to show, if not the identity, at least the very close relationship of the deficient substance of tropical macrocytic anæmia and Castle's extrinsic factor (e.g., Strauss and Castle, 1932). Wills (1931), who at first seemed to be inclined to the view that the deficient substance in tropical macrocytic anæmia and the extrinsic factor were identical, later (Wills, 1934) was sceptical, and now (Wills and Evans, 1938) favours the view that the former may be an independent hæmopoietic principle. The present writer (1936) put forward the suggestion that tropical macrocytic anæmia might be due to deficiency of an independent hæmopoietic principle. When his paper was being written, Greenspon's (1936) paper had only just appeared, and the writer felt that any theory on the ætiology of a macrocytic anæmia must be considered in the light of Greenspon's work, as well as that of Castle. Further, in Greenspon's theory there was no place for tropical macrocytic anæmia, so that had this theory been accepted the ætiology of tropical macrocytic anæmia would need to have been reconsidered. Ungley (1936), criticizing the present writer's suggestion that this anæmia might be due to the absence of an independent hæmopoietic principle, wrote 'this view rests partly on the assumption of the probable correctness of Greenspon's theory', which he then proceeded by quoting recent experimental work to upset, as subsequently other workers have done more completely. Beyond the fact that Greenspon's theory made some reconsideration absolutely necessary, the writer's suggestion did not depend in any way upon the correctness of this theory. The rest of Ungley's criticism was aimed at showing that marmite did not act as an independent hæmopoietic factor in pernicious anæmia; this will be referred to below.

The writer feels that, in view of certain recent work, it is time to reconsider the classification of the anæmias as far as it applies to tropical macrocytic anæmia.

It is assumed that in tropical macrocytic anæmia as well as in pernicious anæmia the pathological changes that occur in the erythron are brought about by the deficiency of a hæmopoietic principle (hæmopoietin) which is a combination of two factors, the intrinsic factor normally present in the gastric secretions and the extrinsic factor normally present in food; in pernicious anæmia the former is absent or deficient and in tropical macrocytic anæmia the latter. Therefore, in these two diseases those pathological changes that can be attributed to the absence of this hæmopoietic principle, as well as the resulting clinical changes, should be identical. Tropical macrocytic anæmia may be a pure food deficiency and in this disease there are not necessarily any predisposing pathological lesions, but in pernicious anæmia there are very striking pathological changes in the gastric mucosa (Magnus and Ungley, 1938) which lead not only to deficiency of the intrinsic factor but to achlorhydria, deficient secretion of pepsin, and possibly other digestive disabilities. Therefore, if the current hypothesis of the ætiology of these two diseases is to be upheld, any constant differences in the pathology and clinical picture must be attributable to these gastric changes directly, and not through the deficiency in hæmopoietic principle.

Pernicious anæmia and tropical macrocytic anæmia

It will be as well to review rapidly the points of similarity and the differences between these two diseases, pernicious anæmia and tropical macrocytic anæmia. In the case of the former, the characteristic pathological changes and clinical picture are generally recognized, but as far as the latter condition is concerned it will be necessary to quote the observations of different workers and to keep in mind the possibility that we may not be dealing with a homogeneous group, particularly in regard to ætiology.

Sources of data

Wills (Wills, 1931, 1934, and Wills *et al.*, 1937) has given a fairly clear definition of the disease with which her name is rightly associated, namely the non-hæmolytic macrocytic anæmia seen in its most typical form in pregnant women but occurring also in non-pregnant women and men in the tropics, associated with a deficient dietary, and curable by marmite or crude liver extract.

Fairley *et al.* (1938) give the data from 37 cases of macrocytic anæmia (out of a total of 39 cases of anæmia) amongst Macedonian refugees, men and women; there were amongst these hæmolytic and non-hæmolytic cases, and the clinical picture was complicated by a cent-per-cent malaria infection, either past or present.

The present writer's experience includes about 50 cases of anæmia a year for the last four years treated in the Carmichael Hospital for Tropical

Diseases, Calcutta, in which fairly complete investigations have been carried out (including sternum puncture during the last two years); about half of these were of the macrocytic type, hæmolytic or non-hæmolytic; from amongst these, selected cases have been reported from time to time (Napier, 1936, 1938; Napier *et al.*, 1938). The majority of these patients were males. Two separate groups, 52 and 57 cases respectively, of anæmic pregnant women were investigated in two different localities in Assam (Napier and Bilimoria, 1937, and Napier and Mazumdar, 1938); in both groups the picture was complicated by malaria and hookworm infection; in the latter locality malaria was a more serious problem than in the former, and the reverse was probably true of hookworm infection. In each group the anæmia was 'mixed' but in about half the cases there was evidence of a 'macrocytic tendency' and in those of the latter group of 'marmite-liver factor' deficiency. Nearly all were of the hæmolytic type.

Similarities.—The points of similarity are, that they are both macrocytic anæmias with the signs and symptoms common to all anæmias, that the raw-beef tongue of pernicious anæmia does occasionally occur and more frequently there is only some tenderness in tropical macrocytic anæmia, that loss of appetite, dyspepsia and low irregular fever are common in both (but are symptoms that may occur in any anæmia), and finally that response to oral or parenteral treatment with crude liver extract is a common factor.

Differences.—As far as the symptomatology is concerned the outstanding point of difference is the absence of neurological symptoms in tropical macrocytic anæmia; all the workers referred to above have laid stress on this point. Slight numbness and tingling of the toes and feet and diminished knee jerks are the only neurological symptoms that the present writer has ever seen in these cases, and these only very rarely. In a large number of these cases the red cell count has been below a million per c.mm. and in some as low as half a million, so that it is certainly not a matter of degree of the anæmia. Sore tongue and glossitis are not nearly so common nor so characteristic in tropical macrocytic anæmia.

In the blood picture the differences are numerous.

Red cells.—The mean cell volume in both conditions is high, but both Fairley's (1938) observations (though he has made certain reservations on account of the method adopted in staining) and those of the present writer* suggest that the mean cell diameter is only slightly above normal, that is to say there is a spherocytosis, in tropical macrocytic anæmia. On the other hand the present writer found in typical uncomplicated tropical macrocytic anæmia (Napier, 1936) that, even when the Price-Jones curve was shifted to the right, the curve did not usually show the degree of flattening that occurs in pernicious anæmia. If the figures quoted by Price-Jones (1933) may be taken as typical of pernicious anæmia, the coefficients of variation given by Fairley for his

cases of tropical macrocytic anæmia were with one exception well below that of the typical pernicious curve. Poikilocytosis is also less marked in tropical macrocytic anæmia. In pernicious anæmia there is usually a slight initial reticulocyte increase, 3 or 4 per cent, but in Wills' experience this is never the case in uncomplicated tropical macrocytic anæmia; this is in keeping with the present writer's experience, only however as far as the non-hæmolytic cases are concerned, but this point will be referred to later. Whilst references are made frequently to the presence of 'megaloblasts' in the peripheral blood, the present writer has never seen the typical hæmoglobinized megaloblast of pernicious anæmia in the peripheral blood in a case of tropical macrocytic anæmia, though occasionally he has seen the basophilic megaloblasts that occur in normal bone marrow.

White cells.—Some degree of leucopenia is the rule in pernicious anæmia. In the non-pregnant hæmolytic cases of tropical macrocytic anæmia the present writer has usually found a marked degree of leucopenia, but this was not usually so in the pregnant women nor in the non-hæmolytic cases. Wills also noted that a leucopenia was not constant but explained this by the normal leucocytosis of pregnancy and by the fact that many of her post-partum cases suffered from slight degrees of sepsis. Neither has the characteristic inversion of the polymorphonuclear/lymphocyte ratio nor the right-handed shift in the Arneht count, characteristic of pernicious anæmia, been noted frequently in tropical macrocytic anæmia.

The van den Bergh reaction.—In pernicious anæmia the indirect van den Bergh is usually positive, 1.0 to 2.5 mgm. per 100 c.cm. (Vaughan, 1934). According to Wills, in uncomplicated tropical macrocytic anæmia it is never positive. The present writer has seen many typical cases of tropical macrocytic anæmia with negative van den Bergh reactions, but the large majority of both his and Fairley's published cases show a positive van den Bergh indirect reaction, *i.e.*, bilirubin above 1.0 mgm. per 100 c.cm. This point will also be referred to later.

Gastric analyses.—As the anti-pernicious-anæmia factor, it is believed, is secreted by the oxyntic cells, there is naturally a parallelism between the secretion of acid and the anti-pernicious-anæmia factor. Complete histamin-fast achlorhydria is, for practical purposes, always found in pernicious anæmia; the incidence in tropical macrocytic anæmia is the same as in the general population, but in the writer's experience the acid secretion in the stomach is slightly below normal and slightly lower than in other anæmias. Wills found the same in her pregnant cases and explained it on the grounds of a normal lowered acid secretion in pregnancy.

Sternum puncture.—Here a certain amount of misunderstanding has arisen through confusion in nomenclature. The red-cell elements are usually distinctly increased, but not so much as

* In fact in case 5, below, the mean cell diameter is so low that one almost suspects an error of technique, but this explanation cannot be accepted.

in microcytic iron-deficiency anæmia; there is also a marked increase in the (normal) basophilic megaloblasts at the expense of more mature normoblasts, but the present writer has only very rarely seen a (pathological) hæmoglobinized megaloblast, the characteristic cell of pernicious anæmia, in a sternum-puncture smear from a case of tropical macrocytic anæmia. Fairley and his co-workers (1938) have made the same observation, and say 'Ripening sufficient to produce a really pink cytoplasm in a cell with finely stippled nucleus was a rarity'.

Treatment.—A large amount of work on pernicious anæmia has been done, but the relevant points are summarized in the following four paragraphs:—

(a) Yeast extract or marmite alone in sufficient doses will produce a hæmopoietic response and eventually a cure in tropical macrocytic anæmia (Wills, 1931; Napier, 1936). Massive doses of yeast extract produced hæmopoietic response in 10 out of 18 cases of pernicious anæmia; an extract made from yeast given by mouth similarly produced a response, but the same extract parenterally did not (Ungley and James, 1934).

(b) Anahæmin produces a response in pernicious anæmia in such small doses as to suggest that almost the whole of the active substance is present in this fraction. Anahæmin, in doses that would produce a maximum response in pernicious anæmia, sometimes produces no hæmopoietic response in true cases of tropical macrocytic anæmia (Napier, 1938, Wills and Evans, 1938, and case 1 below), but in certain cases even moderate doses produce a response (Napier *et al.*, 1938) and, apparently more frequently, massive doses produce a response, which may be delayed and slightly submaximal (Wills and Evans, 1938, and cases 2 and 3 below).

(c) The insoluble (saturated ammonium sulphate) fraction of campolon (comparable to anahæmin) is inactive in tropical macrocytic anæmia and produces a maximum response in pernicious anæmia. The soluble fraction of campolon produces a maximum response in tropical macrocytic anæmia (Wills and Evans, 1938), and also surprisingly in pernicious anæmia (Wills *et al.*, 1937).

(d) Campolon and other 'crude' liver extracts produce a maximum response in both conditions.

Discussion.—As it is in the response to treatment that the most significant similarities and also differences are found, it will be as well to consider this first. The points will be discussed paragraph by paragraph.

(a) These observations are in keeping with the hypothesis that identifies the deficient substance in tropical macrocytic anæmia and Castle's extrinsic factor, but do not exclude the possibility that yeast extract contains both these factors. The response in the cases of pernicious anæmia is explained on the grounds that in the gastric secretions of these cases there remained some intrinsic factor which, when the yeast

extract was given parenterally, could not be utilized. This argument cannot be used to disprove the independent-hæmopoietic-factor hypothesis in tropical macrocytic anæmia unless one assumes, as Ungley seems to have done, that in pernicious anæmia and tropical macrocytic anæmia the pathological processes are identical. Further, his single experiment showing the failure of parenteral yeast extract will have to be repeated. Against this the present writer can quote a case (4) apparently showing a contrary effect, but again this is a single case and not entirely convincing. (For more than two years the writer has been trying to obtain suitable yeast extracts for parenteral injection, but promised samples have never arrived.)

(b) These observations suggest that whilst the whole of the hæmopoietic principle of liver extract, *i.e.*, the combined intrinsic and extrinsic factors, is present in the anahæmin fraction, the deficient factor of tropical macrocytic anæmia is not present or only present in small amounts; this precludes the complete identity of the extrinsic factor and the substance deficient in tropical macrocytic anæmia, but suggests that each may be a combination of substances and that there is some overlapping.

(c) The experiments with the soluble and insoluble fractions confirm the above conclusions, particularly with reference to there being some overlapping, unless one takes the view that by this method the separation of the two fractions is imperfect.

(d) This simply shows that both factors are abundantly present in crude liver extracts.

If one takes into consideration the work of Sudbarow and Jacobson (1936) who claim to have shown that there are at least three fractions in the hæmopoietic principle, the same possibility must be allowed to the hæmopoietic principle of tropical macrocytic anæmia, and one soon finds oneself in a morass of hypotheses from which the only hope of extrication is by very careful quantitative experimental work.

However, to summarize, this recent work on treatment does seem to indicate quite clearly that the deficient substance in tropical macrocytic anæmia is not identical with the extrinsic factor, and that, though in many substances they are closely associated, they can be separated, almost if not quite completely.

As far as the pathology of the two deficiencies is concerned, there is, in the writer's opinion, considerable evidence that the bone-marrow reaction in tropical macrocytic anæmia is different from that in pernicious anæmia; in the latter there is a dysplasia at the megaloblastic level with the formation of pathological megaloblasts, whereas in the former there is a general hyperplasia in the red-cell-forming elements with excessive multiplication but delayed maturation at the megaloblast level, or an anaplasia rather than a dysplasia. In tropical macrocytic anæmia the effect of the deficiency is shown a

little later in the life of the maturing red cell than in pernicious anæmia.

Another important difference between the two diseases appears to be the van den Bergh reaction. For the hyperbilirubinæmia of pernicious anæmia, the explanation that is now given (Witts, 1932) does not seem to be entirely convincing; it is said to be due to the failure to re-utilize the products of normal hæmolysis. This seems to supply the explanation for the excessive storage of iron (hæmosiderin) that occurs in pernicious anæmia, as there is no natural outlet for this substance, but not of the non-iron-containing pigments. Though the non-iron-containing pigments are probably re-utilized to some extent in the formation of hæmoglobin, there is a natural outlet for these pigments and it is only when they are present in excess (in the event of a sudden hæmolysis), or when the outlet becomes blocked or otherwise inefficient (hepatic damage) that hyperbilirubinæmia results. But it seems improbable that the small amount of pigment that is thrown back into circulation by the failure of hæmopoiesis could cause an excess that could not be dealt with by the normal processes of elimination. In the iron-deficiency anæmias, the immediate response to iron administration shows that there is no lack of blood pigments; if iron is not given these are not utilized but their non-utilization does not lead to hyperbilirubinæmia.

Is not the other explanation more probable, namely, that the defective products of hæmopoiesis are readily destroyed by a relatively normal reticulo-endothelial system?

If we accept this second explanation it is easy to understand why there is a lower level of blood bilirubin in tropical macrocytic anæmia where, though the cells are larger than normal, there is less anisocytosis and poikilocytosis and therefore fewer defective cells to attract the attention of the normal reticulo-endothelial tissues, and less hæmolysis. Whether or not this explanation can be accepted, the difference in the bilirubin level in the two diseases seems to be an important difference and to suggest a fundamental difference in the pathological processes of these two anæmias, when they are uncomplicated. The incidence of hyperbilirubinæmia in most of the present writer's and in Fairley's cases can be attributed to a different cause; this is a point that will be discussed later.

Conclusion.—It is quite evident that there are fundamental differences in the pathology and in the resultant clinical picture in these two conditions, and, to return to the original proposition, it seems very improbable that these differences can be attributed directly to abnormalities in the gastric mucosa (other than failure to secrete intrinsic factor) in pernicious anæmia. Therefore, the present hypothesis of the ætiology of these two diseases, which identifies the extrinsic factor of pernicious anæmia and the food-deficiency factor of tropical macrocytic anæmia, cannot be accepted, and the suggestion that the

food deficiency in tropical macrocytic anæmia is the deficiency of an independent substance, or group of substances, necessary for the development of the red cells at the megal-erythroblastic level, just as iron is at the normoblastic level, must be seriously considered.

In the meanwhile the present writer proposes to adopt this as a working hypothesis for discussing the hæmolytic group below:—

ILLUSTRATIVE CASES

Case 1.—A male, Mohammedan, aged 23 years, a student. He took fish but no meat and seldom any milk. He lived in a malarious district in Bengal and had suffered from malaria from time to time. Recently, he had had fever almost continuously and had been treated for kala-azar. He was also becoming anæmic and gave a history of splenic enlargement.

On 18th September, 1938, he was admitted in a weak, anæmic and emaciated condition. His spleen was only just palpable. His van den Bergh (indirect) test was positive at first but later, before he had had any effective treatment, became negative. His anæmia was macrocytic and sternum puncture showed hyperplasia of the red-cell elements and a fair number of 'megaloblasts' (see tables I and II).

He was given 5 injections of anahæmin (2 c.c.) on consecutive days from 21st September. There was little evidence of response and on 1st October he was given an injection of Hepabos (4 c.c.) which was repeated the next day.

On 10th October his red cell count had fallen to half a million. He was then given an injection of Campolon (4 c.c.) which was repeated on the next two days. After this his condition became very critical and for two days he was semi-conscious and did not respond to questions. On 15th October (Saturday) a blood transfusion was ordered, but was not given as no donor of the same group was available. The writer did not see him again until the Monday morning when the clinical picture was entirely changed and he was sitting up in bed. A blood count showed a reticulocyte count of 28 per cent (this was possibly not the peak as no counts had been done on the previous two days), an increase in red cells and a marked drop in the size of the cells. The reticulocyte count fell by stages on the next three days to 6 per cent and the red cell count continued to rise. He is still under treatment (see chart).

Case 2.—Hindu male, aged 27 years, a student. He had lived in Calcutta for a number of years, but had had attacks of malaria from time to time. He was a strict vegetarian and took no fish, eggs, or milk.

He was admitted on 24th September, 1938, complaining of low irregular fever, a pain in the abdomen, increasing weakness and breathlessness of some duration. There was evidence of anæmia, but no sore tongue or splenic enlargement. Gastric analysis showed a low acid curve. The result of sternum puncture is shown in table II; the initial blood count showed a typical macrocytic anæmia (see table I).

Six daily doses of 200 mgm. anahæmin, total 1,200 grammes, were given from 27th September to 2nd October. From 1.5 per cent, the reticulocytes rose to 8 per cent on 3rd October, 14 per cent on the 4th and 22 per cent on the 5th October. The apex of the reticulocyte curve was on the 9th day from the beginning of anahæmin; the red cell count rose sharply and the size of the cell diminished, but neither improvement was maintained, so on 21st October Perhepar (Richter) was given, 2 c.c. daily. The day this was given the patient had a rigor and benign tertian parasites were found in the peripheral blood. His temperature rose daily to 102°F. for three days, but came to normal again without any specific treatment and has remained normal since; the Perhepar was continued up to three daily doses of 2 c.c. each. The next count, which was the last one made, showed a further rise in the red

TABLE I
Blood findings

Case number	1	2	3	4		5			
						1936		1938	
Date	19-9	24-9	13-9	27-5	10-8	8-8	22-10	1-8	19-10
Hæmoglobin in grammes per 100 c.cm.	3.2	3.8	5.8	7.0	11.7	5.5	11.8	3.4	12.24
Red cells in millions per c.mm. ..	0.79	1.2	1.6	2.03	4.38	1.57	4.0	0.8	4.2
Reticulocytes, per cent ..	2.0	1.6	3.2	1.0	0.4	14.4	2.1	12.6	0.2 *
Mean corpuscular volume in cu.µ ..	139	150	125	107	94	125	90	150	89
Mean corpuscular hæmoglobin in γγ	40	31.7	36	34.5	26.7	35	29.6	43	29
Mean corpuscular hæmoglobin concentration, per cent.	28.8	21.8	28.8	32.2	28.5	28	33	28.6	32.6
Price-Jones curves—									
Mean diameter, µ ..	..	7.848	7.632	..	..	..	..	6.938	..
Standard deviation, µ ..	..	0.8085	0.9165	..	..	..	..	0.779	..
Coefficient of variation, per cent ..	..	10.302	12.008	..	..	..	..	11.228	..
White cells in thousands per c.mm.	2.44	4.25	10.6	4.25	..	3.45	..	3.55	7.35 *
Bilirubin, mgm. per 100 c.c. blood ..	1.5	2.5	0	++	0	++	(+)	2	0.25
Spleen, inches below costal margin	0	0	0	0	0	5	P	6	1
Gastric acidity	N	N	v. low	N	..	Normal.		Low.	

* Last count—a few days later.

TABLE II
Sternum puncture counts

Case number	1	2	3	5
Total nucleated cells in thousands per c.mm.	40.55	21.0	280.5	80.5
Red cell series ..	50.0	21.4	40.0	70.75
Megaloblasts ..	17.7	12.0	6.5	3.5
Erythroblasts ..	3.3	1.0	1.75	7.75
Normoblasts ..	29.0	7.4	31.75	59.5
Granular series ..	36.6	42.0	53.0	24.25
Myeloblasts ..	0.0	0.0	0.0	0.25
Premyelocytes ..	0.3	0.3	0.5	0.75
Myelocytes—				
Neutrophile ..	7.0	4.6	8.25	3.75
Eosinophile ..	0.0	0.3	0.25	0.5
Basophile ..	..	0.0	0.0	0.0
Young forms ..	1.0	0.3	1.75	3.5
Band forms ..	25.0	26.3	30.75	13.25
Segmented forms	3.0	8.0	11.25	2.25
Eosinophile ..	0.3	1.0	0.25	0.0
Basophile ..	0.0	0.0	0.0	0.0
Non-granular series	13.3	28.5	17.0	5.0
Lymphocytes ..	8.3	30.3	15.0	3.25
Large mono-nuclears.	3.3	5.6	1.75	0.25
Plasma cells ..	1.7	2.6	0.25	1.50

cells and a drop in the mean corpuscular volume. He is still under treatment (see charts).

Case 3.—A Mohammedan male, aged 27 years, a land-owning cultivator. He was a strict vegetarian but recently on medical advice he had taken a little fish. He gave a history of diarrhoea for nearly two years with occasional fever and increasing weakness.

He was admitted on 13th September in a precarious condition, weak, emaciated, and anæmic; he had a bed sore and he had continuous loose motions which he sometimes passed in his linen. He had a red, sore, denuded tongue and a sore mouth. His spleen was not enlarged. His blood picture was one of macrocytic anæmia. His van den Bergh reaction was negative and remained so throughout. Sternum puncture showed a general hyperplasia of the red-cell elements but the reaction was normoblastic (table II). Fractional gastric analysis without histamin showed a little free acid in one sample only.

His dehydrated condition demanded glucose and saline intravenously. After six daily injections of anahæmin, a total of 1,200 grammes, the reticulocyte percentage was 4, the red cell count had fallen (this was probably on account of the previous dehydration), and the mean cell volume had increased. As his condition was still serious, fearing the possible failure of anahæmin, we gave 'Perhepar' (Richter) 4 injections of 2 c.c. each. On the second day of these injections, that is, the 8th day from the commencement of the anahæmin, the reticulocytes rose to 19 per cent, and on the following day to 33 per cent. The patient's condition improved, the red cells increased and the size of the cells came down and continued to do so, reaching 3,400,000 per c.mm. and 101 cu.µ., respectively, on 19th October without any further specific treatment. He is still under treatment (see chart).

Case 4.—A Hindu female, aged 28 years, married, three children, not now pregnant. Admitted into hospital on 27th May, 1936, with moderate anæmia of the macrocytic type. Gastric analysis showed a normal acid curve.

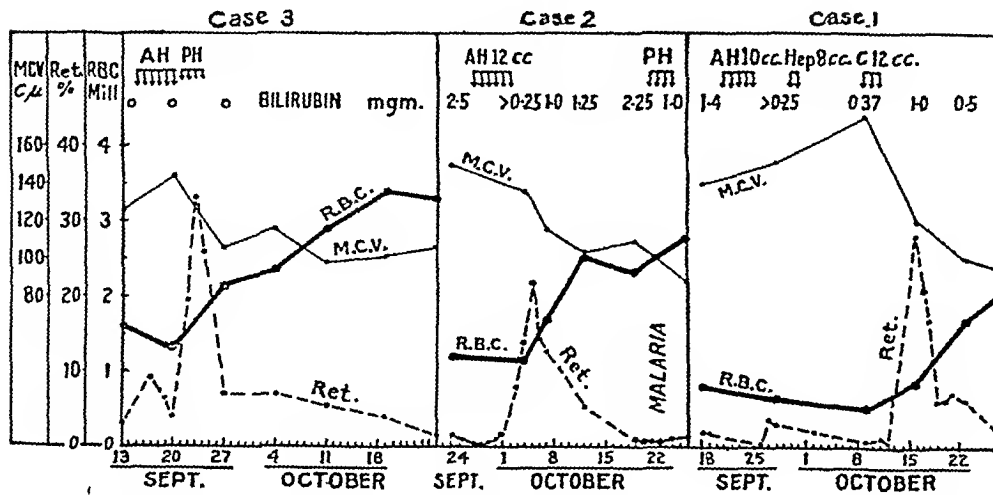
She was given daily intramuscular injections of 'yeast extract' for ten days without any apparent effect; later, she was given another fraction of yeast which appeared to lead to an improved blood picture. Later, whole marmite was given by mouth and the improvement was maintained until a practically normal picture was reached (see chart and table I).

Discussion on illustrative cases

Case 1 is not a truly hæmolytic case although the occasional positive van den Bergh indirect reaction is not explained. Massive doses of anahæmin and adequate doses of Hepabos were apparently entirely inactive, but later Campolon produced a classical response; a 28 per cent reticulocytosis on the 7th day was recorded, but

vicious circle of deficient invalid diet—specific malnutrition—nutritional anæmia and mucosal dysfunction—further diarrhoea—mal-absorption—further malnutrition—and so on. This circle was broken immediately by a suitable diet and injections of liver preparations, and two years' diarrhoea changed to constipation within a few days. As far as the blood condition was

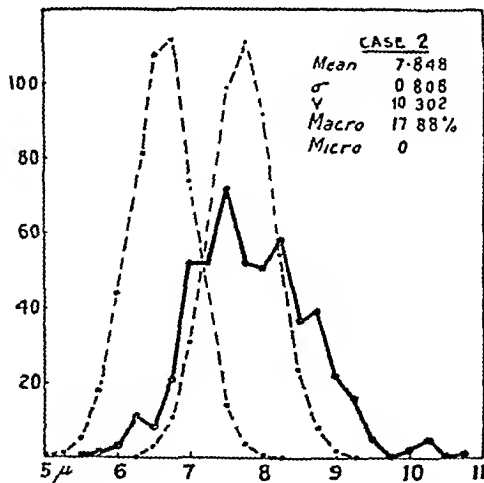
concerned the absence of any response after six days of anahæmin led to a possibly premature conclusion that it was inactive and the injection of a 'crude' liver preparation, so that the interpretation is doubtful, though it seems possible that the late, but maximal and sustained, response in this case may have been brought about by a combination of anahæmin and the 'crude' liver preparation.



it is possible that the peak was reached before this.

Case 2 was again not a typical hæmolytic case; the hyperbilirubinæmia at the first examination was probably caused by a recent malarial attack, and on the second occasion a malarial attack was demonstrated. After anahæmin the reticulocyte curve did not start to

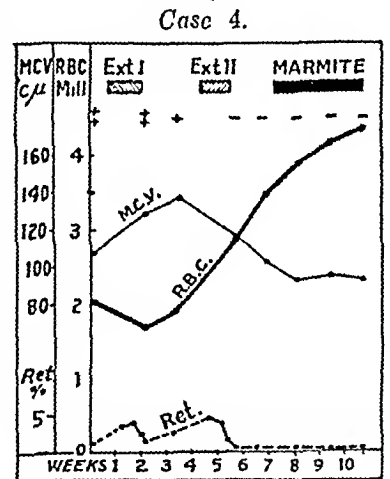
Case 4 is not a satisfactory one. There is however some suggestion that a yeast extract given parenterally had a curative effect. Though the lowness of the reticulocyte response might be explained on the high initial red cell count and the low potency of the extracts, the whole improvement might be attributed to rest in bed and a good diet.



Before treatment.

rise until the 7th day and did not reach its peak until the 9th day; further, the rise was sub-maximal. This suggests that the early doses had little effect and that the result was only achieved by the mass action of the repeated doses. The failure to sustain the improvement in the red cell count, and the immediate improvement despite a malarial attack when injections of 'crude' liver extract were given, also point to the fact that the effect of even this massive dose of anahæmin was not maximal.

Case 3 was quite definitely non-hæmolytic. The history was strongly suggestive of food deficiency complicated by diarrhoea, which started a



THE HÆMOLYTIC GROUP

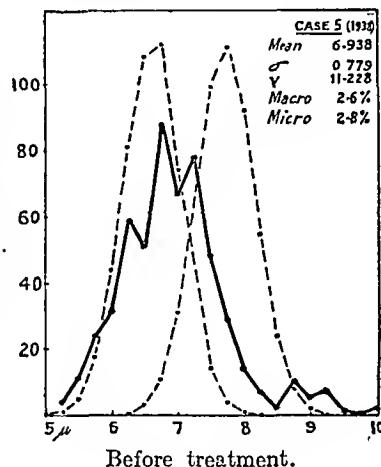
In the paper already referred to, the present writer (Napier, 1936) expressed the view that the cases of macrocytic anæmia which he was then reporting, though exhibiting some common features, notably response to marmite, could not be grouped as Wills' tropical macrocytic anæmia and were not themselves a homogeneous group. Further experience has however tended to make him modify this opinion. By their response to treatment by different liver 'fractions' and different liver preparations, he hoped to separate these anæmias into distinct ætiological groups, but up to the present the results have been singularly disappointing (Napier, 1938, and Napier *et al.*, 1938); one finds in clinically and hæmatologically identical cases classical response to anahæmin in one, late response in another, and no response in a third, and on the other hand a non-hæmolytic case with no splenic enlargement responding in exactly the same way

as a hæmolytic case with high initial reticuloocyte count and a large spleen. The view to which the writer is now inclined is that the deficient factors in these two types of macrocytic anæmia are groups of substances, if not identical, closely allied and showing a considerable amount of overlapping, but that the causes of the deficiency or relative deficiency are various, as in the case of iron-deficiency anæmia, and that one of the most important ones, especially in tropical and sub-tropical countries, is the hæmolysis associated with post-malarial reticulo-endotheliosis,* usually shown clinically by splenic enlargement.

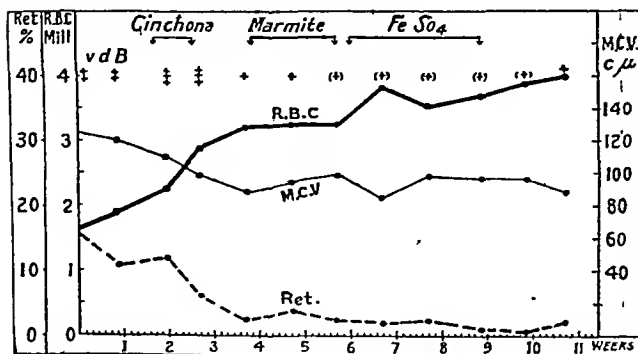
This view that excessive hæmolysis might determine the deficiency in an individual on a border-line diet has already been put forward by the writer (Napier, 1936) and is strongly supported by recent experience; Napier and Mazumdar (1938) in discussing the part played by malaria in the production of macrocytic anæmia in their cases say, 'our suggestion is that it is not the acute attack—which is often not accompanied by a positive van den Bergh reaction—but the chronic state with the damaged reticulo-endothelial tissue in the spleen and elsewhere that is most likely to be the determining factor in producing this anæmia' and in their conclusions they suggest that the anæmia is produced by 'a relative deficiency in important food factors probably associated with the vitamin-B₂ complex' and 'by a state of chronic malaria'. Fairley and his co-workers (1938) have also suggested that, when dietary deficiency complicates excessive blood-cell destruction by a hypertrophied reticulo-endothelial system, this may lead to a 'panmyelopathy and megaloblastic hyperplasia in the bone marrow'; they visualize a condition in which 'the reticulo-endothelial system, irritated, activated and hypertrophied as a result of repeated malarial infections, phagocytoses those non-parasitized

abnormal corpuscles in considerable numbers with the production of hæmolytic anæmia', and consider that tropical macrocytic anæmia should be divided into a hæmolytic and a non-hæmolytic group.

To be more explicit the writer postulates a substance (or substances) normally present in marmite and crude liver extract which is required *quantitatively* for the normal maturation of red cells at the megal-erythroblast level; it is a substance that is possibly stored in the body, but is not a by-product of hæmolysis, or, if it is, is not re-utilizable, as is iron, for example. A normal mixed diet contains sufficient of this substance for normal requirements, and, together with the possible storage reserve, for emergencies such as hæmorrhages and moderate hæmolyses, but in severe and chronic hæmolyses—which demand a much greater corpuscular replacement than any non-fatal hæmorrhage—the reserve is rapidly exhausted and there may be a deficiency, which will be exaggerated if there is a deficiency of this substance in the food. A diet grossly deficient in this substance will also in time give rise to pathological changes, which will be exaggerated by conditions of extra demand such as pregnancy, or of mal-absorption, as in sprue and lenteric diarrhœa (case 3).



Case 5 (1936).



* The writer is using this term in full knowledge and in defiance of the fact that it has already been applied to monocytic leukaemia, an application that Forkner (1938) and others unreservedly condemn.

The present application of the term seems to be justified in that the body reaction to malarial infection is both hypertrophy of the fixed reticulo-endothelial tissues and mobilization in the blood of the free reticulo-endothelial cells, the histiocytes (Napier, Krishnan and Lal, 1932).

The following illustrative case is a very good example of a typical case of the hæmolytic type of tropical macrocytic anæmia as encountered in Bengal:—

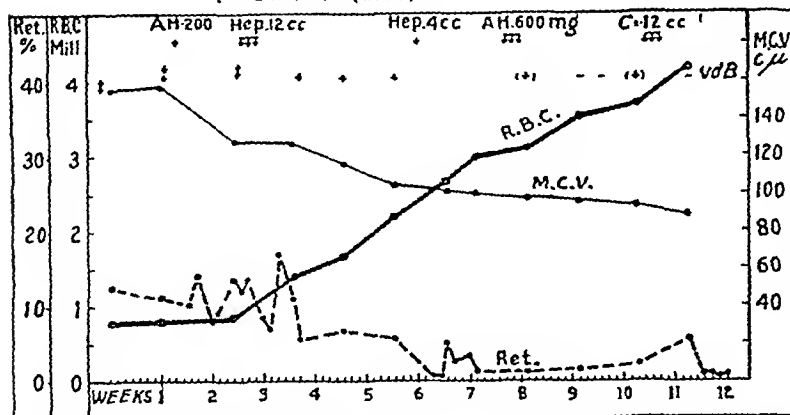
Case 5.—The patient was a male, aged 19 years, an orphan of poor cultivator class. He was not a strict vegetarian, but the opportunity for eating anything but rice seldom arose; living in the vicinity of Calcutta, his family had acquired the habit of eating polished rice.

He gave a history of fever on and off for many years, increasing enlargement of the spleen for a few years, and weakness and other symptoms associated with anæmia. Kala-azar was suspected, but was soon excluded.

He was admitted into hospital on 8th August, 1936. He had a low irregular fever for a week or so. His liver was enlarged. His spleen was firm, but not hard, and reached almost to the navel. A puncture showed no leishmania, no malarial parasites, nor malarial pigment; the smear showed many macrophages, and many nucleated red cells, also some groups of dividing erythroblasts which suggested that the spleen contained foci of extra-medullary hæmopoiesis. The gastric analysis showed a low free-acid curve. Sternum puncture was not done. No malarial parasites were ever found in the blood. His initial blood count is shown in table I (above).

He was given the ordinary hospital 'full' diet, which is a good mixed diet of about 2,700 calories, but no special foods nor medicines other than purgatives. His blood picture steadily improved and the spleen decreased in size. Cinchona febrifuge was given on 20th August for seven days, as a routine procedure; no parasites had been found nor was there any fever at the time. The red blood cell curve appeared to rise more rapidly after this, but the reticulocyte percentage fell. Later, marmite and iron were given

Case 5 (1938).



at different times, but these did not seem to affect the progress in any way. At the end of two and a half months the red cell count had reached four millions: the rest of the blood findings are shown in table I. The spleen was just palpable but the liver was normal. The patient considered himself cured and left hospital (see chart, page 7).

The evidence of the chart suggests that he would have improved and his blood would have returned to normal without any treatment other than rest in bed and a good diet.

This patient provides a very good example of chronic malarial reticulo-endotheliosis, in which repeated malarial infection had led to hyperplasia of the reticulo-endothelial tissues, in the liver and spleen in particular, which not only destroyed malarial parasites and prevented their multiplying to the extent of producing a clinical attack of malaria, but also phagocytosed uninfected but damaged and abnormal red cells. Thus, a vicious circle was set up in which irritated and over-activated reticulo-endothelial tissue phagocytosed red cells almost indiscriminately and thereby aggravated the anaemia and increased the demand for haemopoietic substances, the supply of which was already inadequate; this led to further disordered haemopoiesis and the production of more defective red cells, further hyperplasia of phagocytic cells, and further hypertrophy of reticulo-endothelial tissues. This vicious circle was broken by an increased supply of the haemopoietic principle in the food which ensured more orderly haemopoiesis, reduction in the number of abnormal cells, and therefore in the work of the phagocytic tissues, so that a general retrogression of this tissue set in. Though it may have allowed for the return of the blood picture to normal and the disappearance of evidence of excessive haemolysis—the reticulocytosis and the hyperbilirubinaemia, this retrogression only reached a certain point and still left an hypertrophied reticulo-endothelial system which could easily be reactivated

by repeated malarial infections combined with dietary deficiency.

In this particular case the patient returned to his same poor home and poor diet, and though there was no positive evidence of another malarial infection he reported sick again on 1st August, 1938, almost exactly two years after his first admission with a similar history of some months' irregular fever, and in the same condition, except that his general condition was worse and the anaemia more marked.

The blood picture at the time of this admission is given in table I and chart on page 7. A spleen puncture showed a state of affairs exactly the same as on the previous occasion, evidence of both haemolysis and extra-medullary haemopoiesis, and the sternum puncture showed a general erythroblastic hyperplasia, but few megaloblasts (see table II). Despite his previous history, we felt that his serious condition demanded active measures and after a few days he was given a single injection of anahamin, 200 mgm.; this was not followed by any improvement in the blood picture and on 19th

August he was given 5 c.cm. of 'Hepabos'; this dose was repeated on 20th and 21st August. The reticulocyte count had been irregular but on 24th August there was a sharp rise from 7 to 17 per cent followed by a fall to 6 per cent in two stages. During his stay in hospital he was given other liver preparations and on each occasion there was some evidence of acceleration of improvement; his blood improved to well over 4 millions in the same period of two and a half months, despite the original lower level and the slow improvement at the beginning (see table I and chart). Again, the spleen was reduced considerably, being now level with the costal arch. The van den Bergh reaction was positive at first (2 mgm. per 100 c.cm.), but decreased throughout treatment and was finally negative.

The sequence of events in this second attack is interpreted as follows: The patient returned to his unsatisfactory diet and his malarious home; he was submitted to further malaria infections; this reactivated the phagocytic cells in the already increased bed of his reticulo-endothelial tissues and led successively to increased blood-cell destruction, increased blood formation, exhaustion of the inadequate supply of haemopoietic principle, haemopoietic dysfunction with the formation of abnormal cells, and a repetition of the whole vicious circle. On this second occasion, as the condition had progressed further, more of the haemopoietic principle than could be supplied in the diet was required, but the massive doses supplied in the liver preparations were sufficient to break the circle and bring about an almost complete cure, except possibly for some further damage to the reticulo-endothelial tissues.

It will be seen that the cause of the hyperbilirubinaemia in the haemolytic type of tropical macrocytic anaemia is different from that in pernicious anaemia: in the latter it is due to increased phagocytosis of gravely abnormal red cells by normal reticulo-endothelial tissues, whereas in the former it is due to increased phagocytosis of normal and slightly abnormal

cells by hypertrophied and abnormal reticulo-endothelial tissues.

Future investigation.—The writer is painfully aware that he has done little towards clarifying the aetiology of tropical macrocytic anaemia and nothing towards identifying the deficient substance. Dr. Lucy Wills has done invaluable work with her experiments on the nutritional anaemia of monkeys and it is possibly along these lines that further clarification may be sought, but there are always limits to the analogy between pathological processes in two different genera. As far as clinical experimental work is concerned, careful *quantitative* work with only purified fractions of autolysed yeast and liver extract seems to offer the best prospects.

Summary

The identity of the food substance deficient in tropical macrocytic anaemia and Castle's extrinsic factor (of pernicious anaemia) is questioned.

The differences between these two diseases, particularly with reference to the response to treatment, are discussed and illustrative cases cited.

The writer considers that recent work, which is discussed, has added support to his suggestion that in tropical macrocytic anaemia the deficient substance is not identical with Castle's extrinsic factor but is an independent haemopoietic principle.

The writer, modifying his previous opinion, considers that there is a close relationship between the haemolytic and non-haemolytic types of tropical macrocytic anaemia and that malaria is an important predisposing factor in the former.

A typical case of this type of haemolytic anaemia is reported and the writer's interpretation of the mechanism of the production of the anaemia in this case is given.

Lines for future work are suggested.

Acknowledgments

My thanks are due to my assistants, Drs. C. R. Das Gupta and D. N. Mazumdar, for the blood counts in the 4 recent cases quoted (the latter is a worker under the Indian Research Fund Association); also to the British Drug Houses and other manufacturers for a free supply of the preparations used.

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THE PATHOGENESIS OF THE COMMONER TYPES OF SPLENOMEGALY MET WITH IN INDIA

By M. N. DE, M.B. (Cal.), M.R.C.P. (Lond.)

*Professor of Medicine, Medical College, Calcutta, and
 First Physician to the Medical College Hospitals,
 Calcutta*

and

B. P. TRIBEDI, M.B. (Cal.), D.B. (Lond.)

*Professor of Pathology and Bacteriology, Medical
 College, Calcutta, and Bacteriologist to the Government
 of Bengal*

(From the Department of Pathology and Bacteriology,
 Medical College, Calcutta)

THE spleen is an organ which has long been known to be associated with important functions of life. By its spontaneous rhythmic contraction the organ acts as an ancillary respiratory organ (Roy, 1881, Schäfer and Moore, 1896, Barcroft, 1926, and Barcroft and Stephens, 1927) and it can supply additional oxygen carriers when such a demand arises (McNee, 1931). The spleen, again, is one of the sites where destruction of old and damaged red blood cells takes place, which process results in the production of bile pigments (McNee, 1923). Though not yet fully understood, there is still ample reason to believe that the spleen is related with the destruction of thrombocytes (Rosenthal, 1925). Again there are equally good reasons to believe that this organ has an intimate relationship with digestive metabolism and specially of cholesterol metabolism (MacAdam and Shiskin, 1923, Abelous and Soula, 1920, 1925). For a long

(Continued from previous column)

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* Dr. Bilimoria spells his name with one 'l'. Confusion has arisen through certain editors altering the spelling to 'Billimoria' without reference to the author. Others have allowed him to use the spelling he prefers. As uniformity seems desirable, we propose to adopt the correct spelling, ignoring the previous errors.

abundance (plate II, figure 4). This type of splenomegaly which is the result of a chronic and repeated malarial infection although it diminishes in size to some extent often persists for a very long time after the infection is cured, sometimes throughout the greater part of life in spite of all the treatment given to the patient.

The types of splenomegaly described above are always accompanied by varying degrees of hepatic enlargement which is found to be due to the accumulation of pigments in the Kupffer's cells as well as marked engorgement of the liver capillaries (plate III, figure 5). These fixed reticulo-endothelial cells not only proliferate in number but also increase in their size exactly in the same manner as they do in the spleen. As it takes a very long time to dispose of their heavy load of inert pigment the hepatic enlargement also persists for a long period like the splenic enlargement. The hepatic cells may contain hæmosiderin granules and also show some degree of fatty change but no hæmozoin pigments are ever found inside their cytoplasm. It may be definitely stated that in malaria, inflammatory reaction of any kind is not met with in this organ, although in very chronic and long-standing infections one may find collections of mononuclear cells limited only to the portal spaces. If we take cellular accumulations as evidence of irritation they might produce some fibroblastic reactions in these areas, giving rise to thickening of the connective tissues, but even such a change is not constant in the average chronic case of malaria met with in the autopsy room. Such a change, however, can neither produce an appearance of portal cirrhosis nor the clinical phenomena of the common cirrhosis of the liver. The hypothesis of cirrhosis of the liver of malarial origin, although advocated in older times, cannot be supported in view of the histological findings enumerated above.

Kala-azar.—Now let us see what changes we may find in the spleen when the individual is infected with *Leishmania donovani*. To all intents and purposes, the series of changes are essentially the same, modified only by certain biological characteristics of the infecting parasites. When these latter gain entrance into the body of the host, they are at once phagocytosed by the reticulo-endothelial cells which instead of killing them appear to give them a shelter for growth and multiplication. The parasites do not seem to remain extra-cellular for any length of time, but are taken up immediately inside the cytoplasm of the clasmatoocytes, some of which may be found to contain hundreds of them. Wenyon (1926) after Nattan-Larrier reported the presence of the parasites inside the hepatic cells; our experience, however, is different in this respect. In fact leishmaniasis is essentially an infection of the reticulo-endothelial system (De, 1927 and 1934). The nature of the pathological changes which are brought about in the spleen is therefore exactly similar to that found in

malaria, except that there are no pigments; their place is however occupied by the parasites themselves. As the infective process is a chronic one in comparison to that in malaria we never encounter—in the post-mortem room—such acute changes in the spleen, especially the enormous engorgement of the organ with blood and the extreme degree of stretching of the capsule. In a case with fairly heavy infection the duration of illness lasting for more than 3 months, the spleen is greatly enlarged, being much larger than in any case of malaria of similar duration. It is soft in consistence and has a dull red or chocolate colour. The surface is smooth and the capsule is somewhat thinned. The organ cuts easily and the sensation is that of cutting through a muscle or liver. The cut surface which bulges out presents small alternate elevations and depressions (plate I, figure B), the former representing the congested and hyperplastic pulp areas and the latter the region of the atrophic Malpighian follicles with the arteriole. Histological examination reveals a very characteristic picture. The pulp consists of nothing but large phagocytic mononuclear cells—the reticulo-endothelial cells, containing the parasites in large numbers and many dilated blood sinuses. Both the stroma and the reticulum are very insignificant (Shanks and De, 1931). The pulp areas become larger and encroach considerably on the follicles which *pari passu* diminish in size and, in a fairly long-standing case, disappear almost completely, leaving behind just a few lymphoid cells aggregated around an arteriole. The parasites are quite easily made out always inside the large mononuclear cells, their number varying somewhat according to whether the case is an acute or a chronic one. As a rule, these are always very numerous in an acute case but their number is not at all insignificant in a chronic one. The vascular spaces which are widely dilated and engorged with blood (plate III, figure 6) show also many large mononuclear cells containing the parasites (plate III, figure 7). The trabeculae which form such prominent structures in a chronic malarial spleen are very few and far between and many of them are thin and atrophic looking. No hæmozoin pigment can be detected

EXPLANATION OF PLATE I

Fig. A.—Coloured diagram of a section of spleen from a case of chronic malaria (malignant tertian infection) showing the characteristic slate blue colour with increase of connective tissue trabeculae standing out as whitish strands. (These are not very clear in this plate.)

Fig. B.—Coloured diagram of a section of spleen from a case of fairly acute infection with *Leishmania donovani*. It shows a general view of the substance of the organ after it is cut open. The congested and hyperplastic pulp areas may be seen as prominent elevations whereas the depressions represent the areas of the atrophic Malpighian follicles.

Fig. C.—Coloured diagram of a section of spleen from a case of 'Bengal splenomegaly' showing the general appearance of the substance. Compare this picture with that in the section of kala-azar spleen in plate III, figure 8.

PLATE I



Fig. C



Fig. A



Fig. B

PLATE II

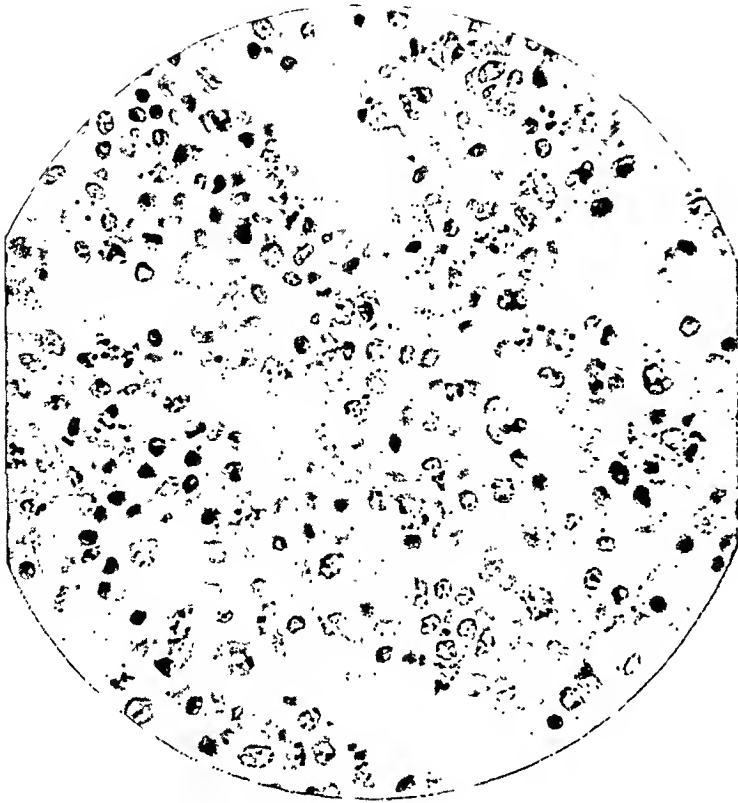


Fig. 1.—Photomicrograph (high power view) of a section of spleen from a case of acute malaria (malignant tertian infection) showing hemozoin pigment inside the cytoplasm of the endothelial and large mononuclear cells.

Objective—Leitz no. 8 mm. (apochromat).
Ocular—Leitz no. 8 × (periplan.).

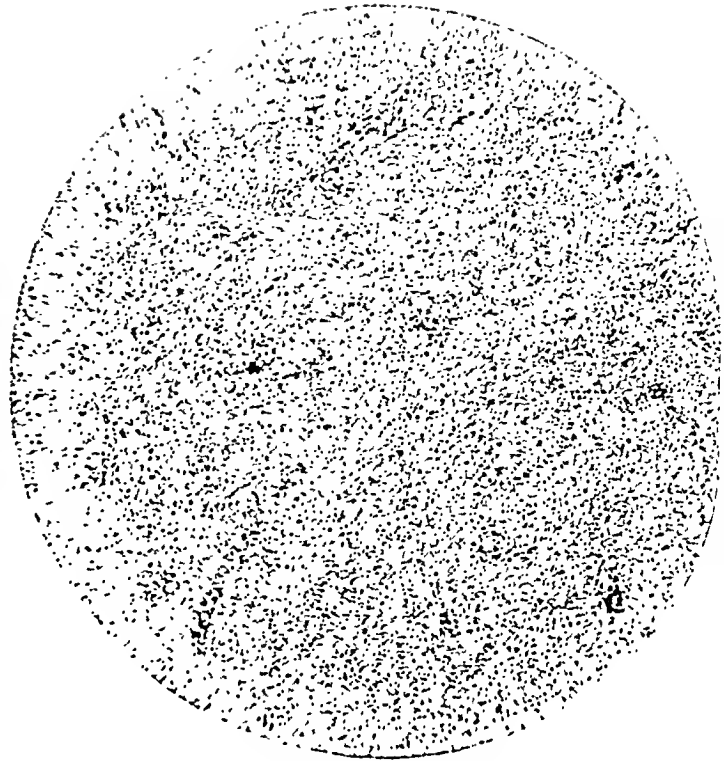


Fig. 2.—Photomicrograph (low power view) of a section of spleen from a case of chronic malignant tertian infection showing marked diffuse pigmentation and connective tissue hyperplasia throughout the substance of the organ.

Objective—Zeiss no. 10 (apochromat).
Ocular—Zeiss no. 4 (compens.).

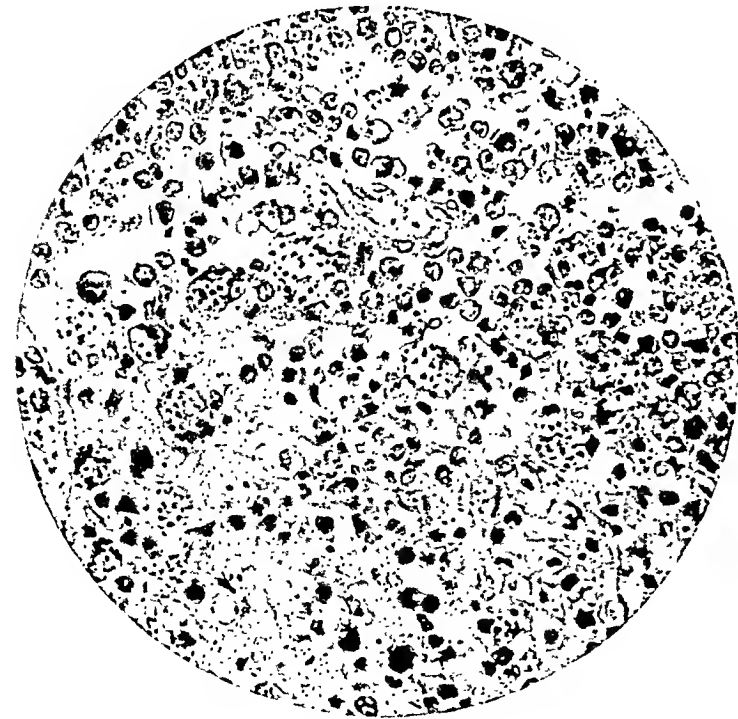


Fig. 3.—Photomicrograph (high power view) of a section of spleen from a case of subacute malaria, showing the cytoplasm of the phagocytic mononuclear cells filled with hemozoin pigment.

Objective—Leitz no. 6a.
Ocular—Leitz no. 8 × (periplan.).



Fig. 4.—Photomicrograph (low power view) of a section of spleen from a case of chronic malaria showing increase of reticulum fibres in the organ.

Objective—Leitz no. 6a.
Ocular—Zeiss no. 4 (compens.).

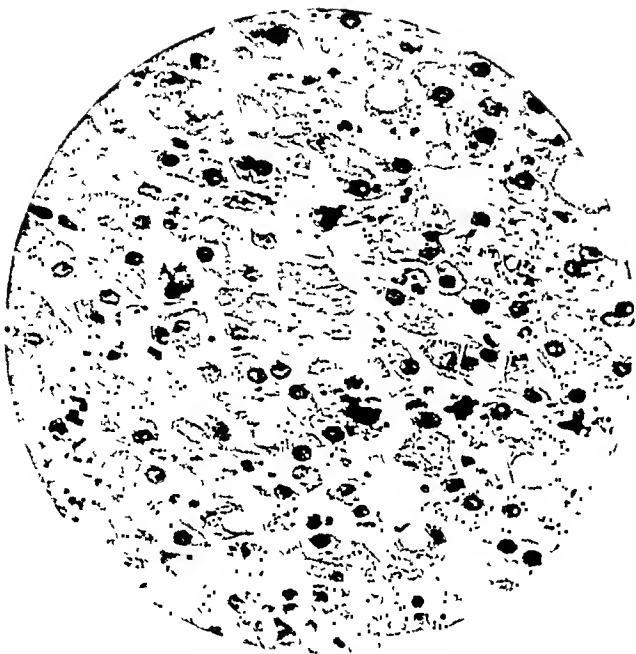


Fig. 5.—Photomicrograph (high power view) of a section of liver from a case of acute malarial infection showing enlargement of the Kupffer's cells and marked accumulation of malarial pigment within their cytoplasm. It will be seen that the hepatic cells are absolutely free from pigment.

Objective—Leitz no. 6a.

Ocular—Leitz no. 8 × (periplan.).

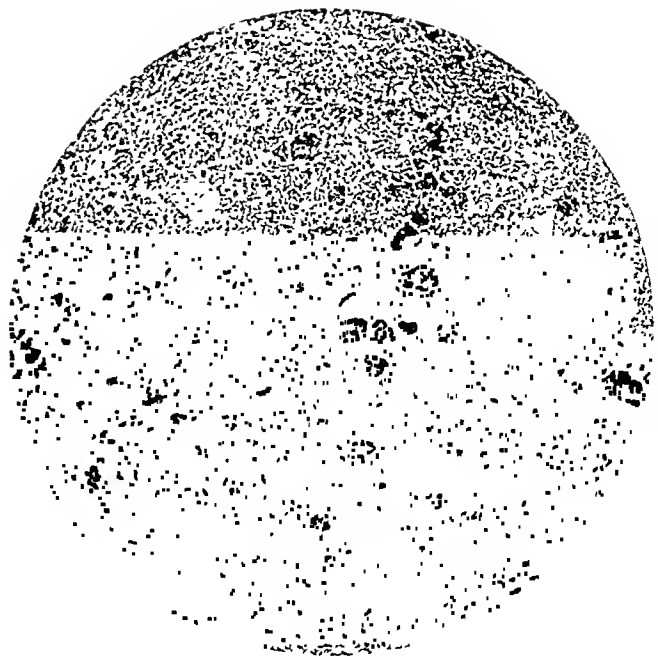


Fig. 6.—Photomicrograph (low power view) of a section of spleen from a case of acute kala-azar showing the widely dilated and engorged blood sinuses and the atrophic Malpighian follicles.

Objective—Zeiss no. 10 (apochromat).

Ocular—Leitz 8 × (periplan.).

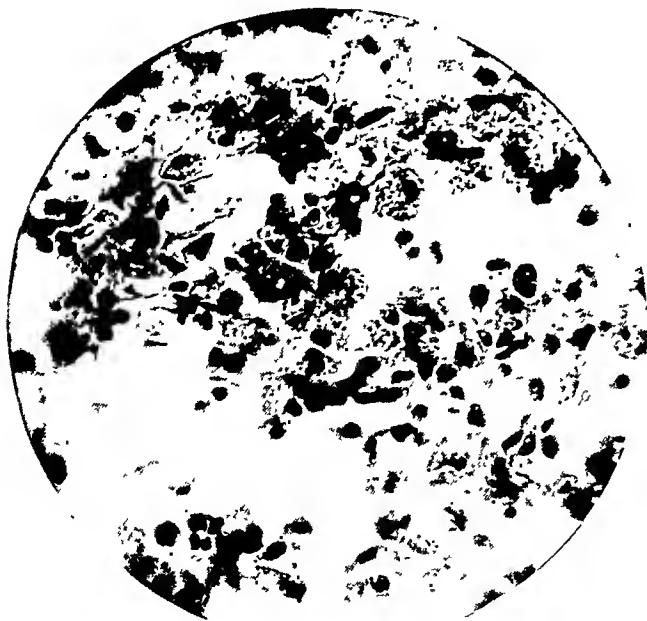


Fig. 7.—Photomicrograph (high power view) of a section of the splenic pulp from a case of acute kala-azar showing a large number of phagocytic mononuclear cells packed with the parasites; the sinuses are much dilated.

Objective—Oil-immersion 1/12 inch.

Ocular—Leitz 8 × (periplan.).

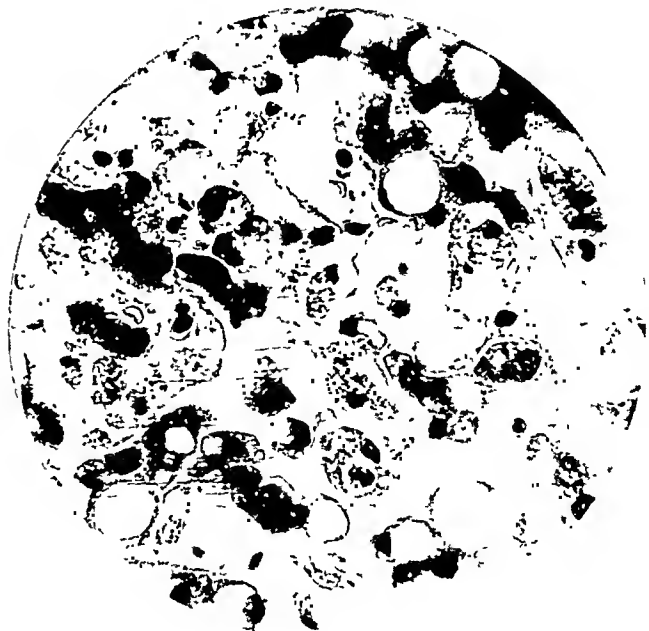


Fig. 8.—Photomicrograph (high power view) of a section of liver from a case of acute kala-azar showing enormous enlargement of the Kupffer's cells and their cytoplasm packed with parasites; the hepatic cells which are free from parasites show various grades of fatty change.

Objective—Oil-immersion 1/12 inch.

Ocular—Leitz 8 × (periplan.).

PLATE IV

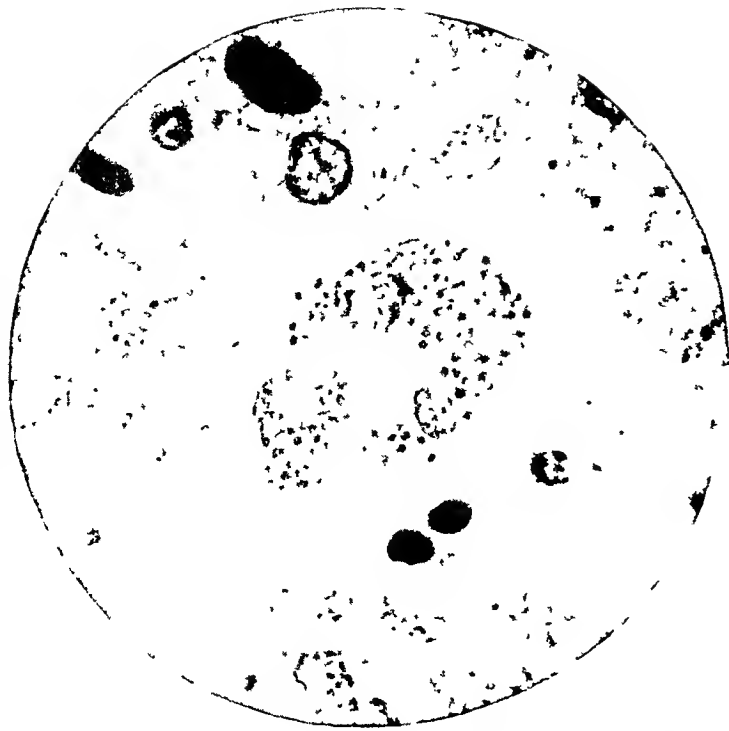


Fig. 9—The same as figure 8 under much higher magnification showing a single Kupffer's cell with numerous parasites.

Objective—Oil-immersion 1/12 inch.
Ocular—Zeiss Homel 20 mm.

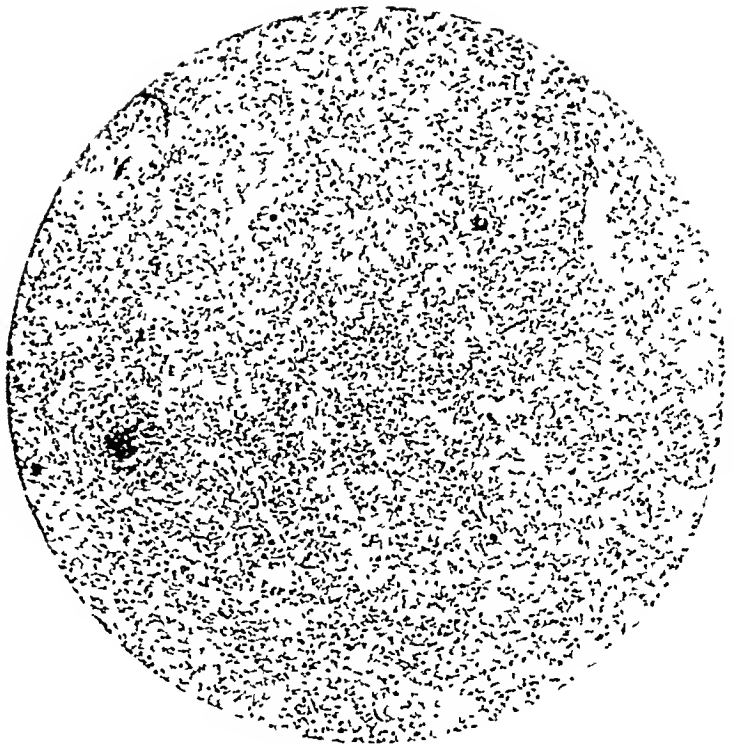


Fig 10—Photomicrograph (low power view) of a section of spleen from a case of 'Bengal splenomegaly' showing an almost complete alteration in the splenic pattern; a much atrophied Malpighian corpuscle may be seen here.

Objective—Zeiss no. 10 (apochromat).
Ocular—Zeiss no 4 (compens.).

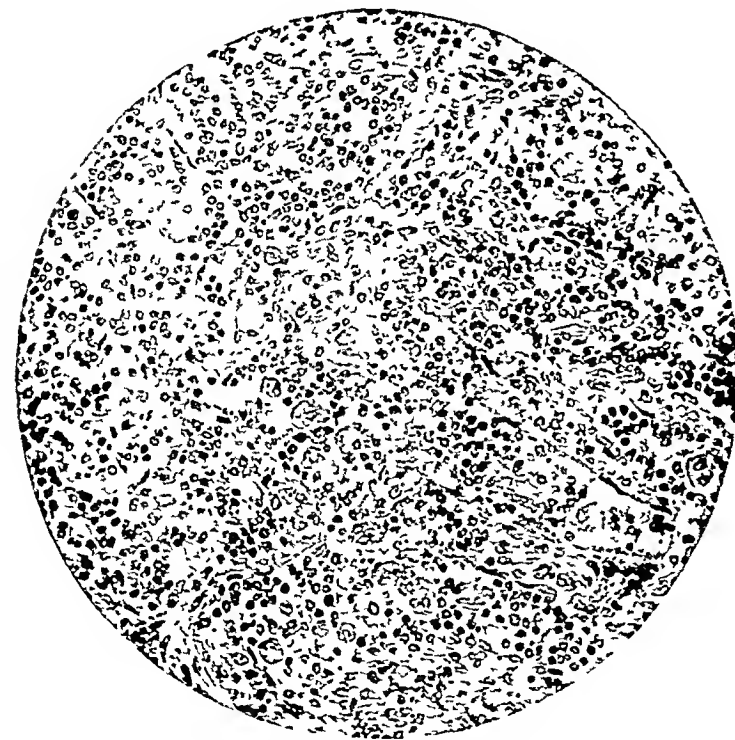


Fig 11.—Photomicrograph (low power view) of a section of spleen from a case of 'Bengal splenomegaly' showing the structure of the splenic pulp which consists of dilated sinuses packed with lymphocytes and many large phagocytic mono- and multi-nucleated giant cells

Objective—Leitz 8 mm.
Ocular—Leitz 8 × (periplan)

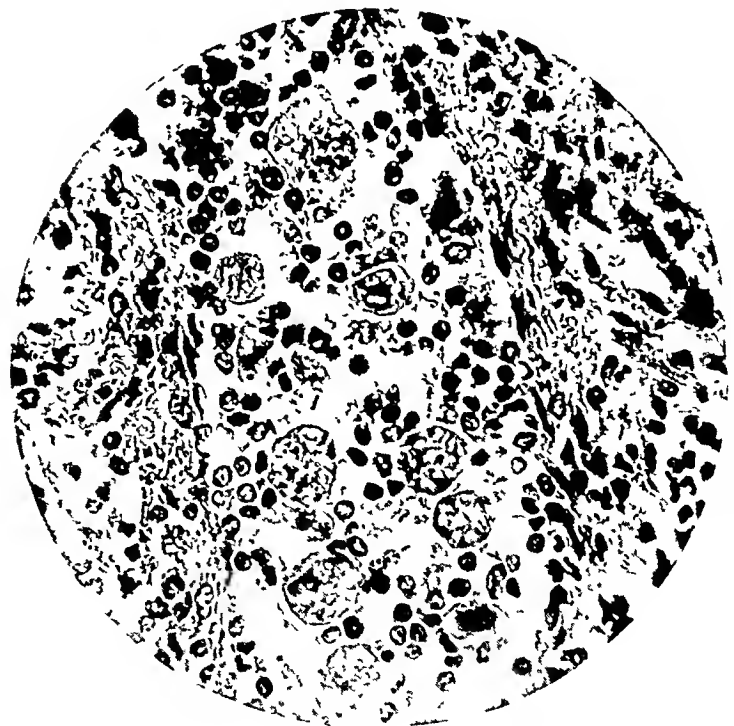


Fig 12—The same as figure 11 under high magnification showing the contents of a blood sinus; note the numerous giant cells with intense red cell phagocytosis

Objective—Leitz 6a.
Ocular—Leitz 8 × (periplan.).

although hæmosiderin may be demonstrated in fairly large amount by treating a section by appropriate methods.

While so much alteration is going on in the spleen, the liver and bone marrow do not remain idle. The Kupffer's cells of the liver show enormous increase in size and number, their cytoplasm being fully packed with the parasites (plate III, figure 8, and plate IV, figure 9). The hepatic capillaries from which these cells draw their nourishment become dilated and engorged, almost looking like sinusoids. The parenchyma cells may show various grades of fatty metamorphosis but they remain always free from parasitization. Although Rogers (1919) described marked increase in fibrous tissue in the organ in general producing definite cirrhotic changes, the idea of pericellular or multilobular cirrhosis resulting from a chronic leishmania infection can no longer be entertained in view of the histological findings stated above. The bone marrow always takes part in the series of changes. The yellow marrow is more or less completely replaced by a red formative marrow in which one would find not only evidence of intense hæmopoietic activities but also the same type of large mononuclear cells with extensive parasitization.

Thus it will be seen, from what has been stated above, that the enlargement of the spleen in leishmaniasis occurs as a result of a demand on the organ for increased work, viz, the disposal of the infective elements. The peculiar mesenchymal reaction, the increased vascularity, the disappearance of the Malpighian follicles, etc., are only different expressions of how the organ meets the emergency. This also explains why the splenomegaly disappears completely when the organ is relieved of its extra burden of work by dealing with the infective agents by means of specific therapeutic measures.

In addition to the above-mentioned conditions, there is a third variety of splenomegaly which is very common in certain parts of India and particularly in Bengal, and which is also due to a morbid process presumably of an exactly similar character (De, 1932, and *Report of S. A. B. of I. R. F. A.*, 1937). The disease has not yet been definitely classified and for want of a proper scientific name it has been provisionally called Bengal splenomegaly [*Ind. Med. Gaz.*, Editorial (1935) and Connor (1933)]. It is characterized by a very long course, usually with little febrile disturbance except at the beginning. Both the liver and the spleen undergo enormous enlargement. There is always a varying degree of anæmia of a hypochromic microcytic type. Most of the patients die of some intercurrent infection, but a certain number of them develop a portal type of cirrhosis of the liver with terminal ascites. At this stage, these cases resemble the clinical picture of Banti's syndrome. Laboratory examinations fail to reveal the presence of any infective agent of a protozoal or bacterial nature.

In a typical case of this kind, the spleen is much enlarged, the degree of enlargement varying with the duration of the illness. In a long-standing case, the spleen may be found to occupy almost three-fourths of the abdominal cavity, the average total weight being 6-8 pounds. The capsule is thick and areas of marked perisplenitis can often be seen on the surface. During section, a good deal of resistance, sometimes a grating sensation, is felt. In a long-standing case the substance is very firm and cannot be easily broken down, the consistency being tough like that of leather. The trabeculae are very numerous and prominent and one can hardly make out the Malpighian follicles (plate I, figure C). Vascular engorgement is very great in the earlier cases and an idea of its extent may be obtained during splenectomy operations. As soon as the ligature is removed from the hilar veins, an enormous quantity of blood flows out of the organ which subsequently shrinks in size. Under the microscope, the normal structure of the spleen is completely altered (plate IV, figure 10) and it often becomes difficult to recognize the splenic pattern. The Malpighian follicles undergo marked atrophy, being encroached upon by the altered pulp. The sinuses are widely dilated and packed with lymphocytes, large phagocytic monocytes, multinucleated giant cells and a fair number of leucocytes (plate IV, figures 11 and 12). Around the sinuses there remains only a small portion of the actual pulp tissue which is very poor in its vital cellular elements. Both the reticulum and the connective tissue elements are much increased and they are responsible for the firm consistency of the organ. This last feature, however, is only prominent in a case of long duration. In spite of all attempts, no parasite could be detected.

A study of the morbid changes occurring in such enlarged spleens shows that the same factors are at work in the pathogenesis of their enlargement as are met with in chronic malaria and leishmaniasis. There is only one difference, viz, that whereas we know the infective agents which initiate the primary change in the last two conditions, it is still unknown in the other. But from what has been described above, it appears that some as yet undetermined infective agent of a low grade of virulence is at work and the splenic enlargement is only an expression of the sum total of its reactions to such a process.

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A STUDY OF TREATMENT OF TETANUS BASED ON A REVIEW OF 38 CASES FROM THE YEAR 1932-1937

By M. G. KINI, M.C., M.B., M.Ch. (Ortho.), F.R.C.S.E.
Surgeon

and

S. VENKATESWARA RAO, M.B., B.S.

House Surgeon,

King George Hospital, Vizagapatam (S. India)

TETANUS as a disease was known to ancient medicine, including Hindu medicine. Hippocrates (460-370 B.C.), the father of modern medicine, described the clinical symptoms accurately. Charaka and Sushruta (900 B.C.?) had also described this condition in Hindu medicine. The transmissibility of this disease to lower animals was demonstrated by Carle and Rattone in 1884. It was Nicolaier of Gottingen who in 1884 first demonstrated in lower animals 'tetanus' by inoculating earth into them. Kitasato in 1889 was the first to obtain the organism in pure culture. Prior to the Great War, only accidental wounds caused tetanus among the civil population and the mortality rate was high. The discovery of the anti-serum of tetanus by Kitasato and Behring has revolutionized the prophylactic treatment of this disease. The prophylactic treatment was put to the acid test in the war with remarkable diminution in the incidence of tetanus cases as a result of wounds. In the early part of the war the incidence and mortality rates were high. Routine administration of anti-serum in every case of gun-shot wound decreased the incidence and mortality rates. Among 2,032,142 wounded, 2,385 developed tetanus giving an incidence of 1.17 per 1,000 wounded (Bruce). The mortality rate of 62.5 per cent in 1914-15 was reduced to 45.9 per cent in 1916-17 and 31.9 per cent in 1918-19 (Choyce, 1932). Though the prophylactic

lactic treatment has been a great success, the problem of treatment of tetanus, once it is established, is not solved. Various methods of treatment from time to time have been advocated with comparative statements in support of the greater success claimed for the respective methods. The results, however, remain far from satisfactory, because as many as 50 per cent die after any improved methods of treatment. Though this mortality rate may be an improvement on the old mortality rates yet it cannot be considered satisfactory. The object of this paper is to show the results obtained by a simple method of treatment followed by the writers in their clinic. It is not claimed that the treatment is ideal, but the results achieved compare favourably with those claimed for more elaborate lines of treatment alleged to be more efficacious. The conditions under which the treatment outlined below was adopted in cases suffering from tetanus were far from satisfactory and far from the ideals of treatment advocated, as it was not possible to ensure the quiet and segregation that is necessary in the treatment of this condition, in our overcrowded wards. The value of this type of treatment became apparent only after tabulating the cases with their results and follow-up.

Out of 4,416 cases admitted in our wards from 1932-1937, 38 were tetanus cases forming 0.86 per cent of the total admissions, i.e., 1 in 116 admissions was a tetanus case. This shows that this disease is common in the civil population of Andhra Desa (India). It is surprising, however, that in spite of the common practice which is found among the village and illiterate folk of treating open wounds with cow-dung as a surgical dressing, there are so few cases of tetanus occurring among them. This is probably due to the fact that the tetanus germ is not usually found in cow-dung. Of the 38 cases that were treated under our care from 1932 to 1937, 33 were males and 5 were females. Most of the cases came from neighbouring villages and had not received any prophylactic treatment at all. There was one case of local tetanus and one case of cephalo-tetanus which are worthy of record.

A Hindu male boy, aged 7 years, was admitted (case 30) with convulsive spasms of both legs coming on every five minutes, on 17th May, 1937, with a history of crushed healed injury of left toe, a month before. A dose of 20,000 units of anti-tetanus serum was administered intravenously with the usual administration of chloral and bromide with marked relief of rigidity of spasms. 10,000 units were given the following day and the boy was subsequently discharged with no recurrence of symptoms, and is keeping perfect health since that time.

The second case, cephalo-tetanus (case 14), was admitted with a history of a scalp wound over the head. No accurate information could be gathered with regard to the incubation period as the patient was having very frequent fits with one-sided facial paralysis and marked lockjaw. His relatives were however certain that he was perfectly healthy prior to the accident. A dose of 40,000 units of anti-tetanus serum was given intravenously and the patient died 15 minutes after admission.

(Continued from previous page)

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Statement of tetanus cases admitted and treated with the results from 1932-1937

Year and serial number	Age	Sex	Site of injury	Incubation period in days	Duration in days	Condition on admission	Frequency of fits	Local treatment	Dosage of anti-toxin	Cost in rupees	Sedatives used	Result and remarks
1932 1	13	H. M.	No injury	..	2	Poor	Very frequent fits with opisthotonos.	Nil	30,000 units in two doses (i.m.).	15-0	Chloral and bromides.	Died in a day.
2	40	H. F.	Do.	..	2	Do.	Do.	Nil	15,000 units in one dose (i.v.).	7-8	Do.	Do.
3	40	H. M.	Abrasions chest.	?	2	Hamaturia	Spasms every 5 to 10 minutes; conscious.	Nil	15,000 units per day in two doses (i.v.). Total 75,000 units.	37-8	Do.	Refused to stay in the hospital.
4	50	H. M.	Head, over parietal region.	20	10	Fair	Very frequent spasms with opisthotonos.	Healing ulcer dressed.	1st day, 20,000 units in two doses (i.v.). 9 days, 19,500 twice (i.v.m.). 2 days, 10,500 units (i.v.) in two doses. Total 216,500 units.	108-4	Do.	Cured.
1933 5	10	H. M.	Three septic ulcers, hip.	?	2	Moribund	Very frequent with marked opisthotonos.	Ulcers dressed.	One dose of 10,000 units (i.v.).	5-0	Do.	Died within a few hours.
6	Not noted	H. M.	Toe	7	8	Fair	Very frequent spasms.	Wound healed.	8 days, 20,000 units a day in two doses (i.v.) Spasms relieved. Rigidity present. 6 days, 10,000 units a day in two doses (i.v.). 15 days, 5,000 units a day, one dose (i.v.). Total 295,000 units.	147-8	Do.	Cured.
1934 7	40	H. M.	No injury	..	7	Poor	Very severe spasms with opisthotonos, with difficulty in breathing.	Nil	10,000 units (i.v.) statim.	5-0	Do.	Died in a few hours.
8	30	H. F.	After abortion by barber midwife.	12	8	Fair	Frequent spasms	Nil	One day, 20,000 units in two doses in a day (i.v.). 3 days, 10,000 units a day in two doses (i.v.). 12 days, 5,000 units a day in a single dose (i.v.). One day, 1,000 units (i.v.) Total 111,000 units.	55-10	Do.	Cured.

Statement of tetanus cases admitted and treated with the results from 1932-1937—contd.

Year and serial number	Age	Sex	Site of injury	Incubation period in days	Duration in days	Condition on admission	Frequency of fits	Local treatment	Dosage of anti-toxin	Cost in rupees	Sedatives used	Result and remarks
9	33	H. M.	Head	?	..	Poor	Very frequent spasms.	Wound dressed.	1st day, 5,000 units a day, once (i.v.). 2nd day, 15,000 units. 10 days at 20,000 units a day in two doses. 5 days at 10,000 units a day in two doses. Total 285,000 units.	147-0	Chloral and bromides.	Developed dysentery and died. Had recovered from spasms completely.
10	30	H. F.	Abortion by a barber midwife.	?	4	Fair	Do.	..	16 days at 20,000 units twice daily (i.v.). Total 320,000 units.	160-0	Do.	Cured.
1935 11	20	H. M.	No injury	?	5	Do.	Spasms increase after external stimulus. Less after 4 days. Open jaw after 12 days.	..	One day, 40,000 units in two doses (i.v.). One day, 20,000 units in two doses (i.v.). 16 days at 40,000 units in two doses twice daily (i.v.). Total 600,000 units.	300-0	Chloral and bromides. Rectal paraldehyde.	Do.
12	40	H. M.	Do.	?	?	Do.	Marked spasms frequently without opisthotonos.	..	One day, 20,000 units in two doses (i.v.). 9 days, 40,000 units in two doses (i.v. and subcutaneous). Rigidity less after 220,000 units. Able to open mouth—11 days (i.v.) 200,000 Subcutaneous 180,000 Total 380,000	140-0	Chloral and bromides.	Do.
13	16	H. M.	Injection for dysentery, intra-muscular, left shoulder.	9	1	Poor; slight sepsis at site of puncture.	Marked spasms every 2 hours.	Local dressing.	One day, 20,000 units	10-0	Do.	Died in 1 day.
14	50	H. M.	Wound head septic.	?	?	Poor; unable to speak; facial paralysis.	Marked fits with tonic contraction; admitted moribund.	Cleaned and dressed.	40,000 units (i.v.) statim.	20-0	..	Died 15 minutes after admission.

1936 15	4	M. M.	Punctured wound right foot.	6	2	Fair	Very frequent spasms; slight opisthotonos.	Do.	8 days, 40,000 units in two doses (i.v.). 10 days, 20,000 units in two doses. Total 520,000 units.	260-0	Do.	Cured.
16	12	H. M.	Punctured wound foot.	9	6	Comatose between fits.	Very frequent fits with opistho- tonos.	Do.	1st day, 40,000 units in two doses (i.v.). 2nd day, 60,000 units in two doses (i.v.). Total 100,000 units.	50-0	Rectal paraldehyde.	Died.
17	7	H. M.	Shin	10	3	Poor	Very frequent fits	Do.	1st day, 20,000 units in two doses. 2nd day, 60,000 units in three doses. 1 (i.m.), 2 (i.v.). 3rd day, 40,000 units in two doses (i.v.). Total 120,000 units.	60-0	Chloral and bromides. Rectal paraldehyde.	Broncho-pneu- monia. Died.
18	30	H. M.	Wound toe	13	5	Good	Frequent spasms	Do.	6 days, 40,000 units in two doses. 4 days, 20,000 units in two doses. Total 320,000 units.	160-0	Chloral and bromides.	Cured.
19	30	H. F.	Abortion	10	3	Fair	Do.	..	1st day, 80,000 units in two doses. 2nd day, 60,000 units in two doses. 11 days, 40,000 units in two doses. Total 580,000 units.	290-0	Do.	Do.
20	40	H. M.	Thorn prick in foot.	5	1	Do.	Spasms very marked rigidity and opistho- tonos.	..	1st day, 20,000 units in two doses. 2nd day, 40,000 units in two doses. 3rd day, 200 units in one dose. Total 80,000 units.	10-0	Do.	Died same day.
21	30	H. M.	No injury	?	1½	Do.	Spasms very fre- quent with tonic contracted stage several times in a day.	..	1st day, 20,000 units in two doses. 2nd day, 40,000 units in two doses. 3rd day, 200 units in one dose. Total 80,000 units.	40-0	Paraldehyde per rectum.	Died.
22	?	H. F.	Thorn prick in foot.	10	1	Do.	Very frequent spasms.	..	1st day, 20,000 units in two doses. 20 days, 40,000 units in two doses. Total 820,000 units.	410-0	Chloral and bromides.	Cured.
23	23	M. M.	Toe	5	1	Poor	Very frequent severe spasms.	..	1st day, 40,000 units in two doses. 2nd day, 40,000 units in two doses. Total 80,000 units.	40-0	Do.	Died.

Statement of tetanus cases admitted and treated with the results from 1932-1937—concl'd.

Year and serial number	Age	Sex	Site of injury	Incubation period in days	Duration in days	Condition on admission	Frequency of fits	Local treatment	Dosage of anti-toxin	Cost in rupees	Sedatives used	Result and Remarks
24	4	H. M.	Forehead	13	2	Good	Rigidity and occasional spasmodic contraction.	Cleaned and dressed.	8 days, 20,000 units in two doses. Total 160,000 units.	80-0	Chloral and bromides.	Cured.
1937 25	20	H. M.	Toe	39	6	Do.	Rigidity always. Spasms 4 or 5 times a day.	Healed	2 days, 40,000 units in two doses. 7 days, 20,000 units in two doses. Total 220,000 units.	110-0	Do.	Developed dysentery; Shiga bacillus isolated from stools. Transferred to medical side; discharged cured from medical side.
26	7	H. M. C.	No injury	..	3	Do.	Rigidity and spasm once in two hours.	..	2 days, 80,000 units in two doses. 3 days, 40,000 units in two doses. Total 280,000 units.	140-0	Do.	Developed broncho-pneumonia and died.
27	?	H. M.	History of injury.	14	7	Fair	Rigidity and very frequent spasms.	..	1st day, 40,000 units each in two doses. Total 80,000 units.	40-0	Do.	Died in 24 hours.
28	12	H. M.	Popliteal space.	5	3	Do.	Spasms every two minutes with opisthotonos.	Cleaned and dressed.	13 days, 40,000 units in two doses. Total 520,000 units.	200-0	Do.	Developed parotid abscess five days after admission. Opened on 10th day. No tetanus bacillus in pus culture. Developed contraction; knee put in extension. Cured.
29	25	H. M.	Compound fracture, both bones.	5	3	Poor	Marked spasms, very frequent.	Do.	1st day, 20,000 units statim.	10-0	Do.	Died in a few hours after admission.
30	7	H. M.	Crushed toe.	30	1/24	Good	Suddenly fell down while walking with spasms of legs and rigidity.	Wound had healed.	1st day, 20,000 units in two doses. 2nd day, 10,000 units in two doses. Total 30,000 units.	15-0	Do.	Local tetanus. Cured.

31	5	H. M.	Do.	30	18	Epileptic	Slightest stimulus spasms with rigidity.	Do.	240-0	Do.	Cured.
32	50	H. M.	Intra- muscular infection of arsenical compound, outside.	43	1	Fair	Rigidity of jaw on admission; sub- sequently devel- oped marked spasms without opisthotonos.	Cleaned and dressed.	40-0	Do.	Died in 2 days.
33	7	H. M. C.	No injury	..	22/24	Poor	Very frequent spasms.	..	20-0	Do.	Died in a few hours.
34	8	H. M.	'Indigen- ous' treat- ment for painful ear.	4	6	Fair	Spasms every now and then.	..	220-0	Chloral and bromides.	Cured.
35	25	H. M.	No injury	..	5	Do.	Very frequent spasms.	..	30-0	Do.	Died in 24 hours.
36	12	H. M.	Fall with abrasions in field.	?	2	Fair: two ulcers on side of tongue at edges.	Frequent attacks of spasms, opis- thotonos.	Boric and glycerine for tongue.	210-0	Do.	Cured.
37	18	H. M.	Untreated lacerated wound.	15	5	Fair	Frequent spasms	Cleaned and dressed.	520-0	Do.	Do.
38	25	H. M.	Toe	26	4	Do.	Spasms every two minutes with opisthotonos.	Wound had healed.	460-0	Do.	Do.

Explanatory notes of abbreviations:--

H. M. = Hindu male.
H. F. = Hindu female.
H. M. C. = Hindu male child.
M. M. = Mohammedan male.
i.v. = Intravenous.
i.m. = Intramuscular.

Injury

The following is a list of injuries that were responsible for the onset of tetanus :—

Thorn pricks ..	2 cases	
Head injury ..	4 "	(1 cephalo-tetanus: case 14.)
Intramuscular injection ..	2 "	(1 after anti-dysenteric serum and 1 after sulpharsenol injection: cases 13 and 32.)
Compound fracture	1 case	
Abortion ..	3 cases	
Injuries to toe ..	8 "	(1 was an epileptic: case 31.)
Penetrating wounds sole of foot ..	2 "	
Injury to chest ..	1 case	
Injury to shin ..	2 cases	
Treatment of a painful ear by a quack ..	1 case	
Popliteal wound ..	1 "	
Ulcers of the hip ..	1 "	
Fall in the field with abrasions ..	1 "	
TOTAL ..	29 cases	

Nine cases gave no history of injury, nor could any external evidence of injury be made out. Out of the 5 female cases in the series, 3 developed tetanus after abortion conducted under unhygienic conditions, and all the three recovered: cases 8, 10 and 19. The two cases that occurred after intramuscular injections were fatal; in both there was mild sepsis at the site of puncture.

It is well established from bacteriological examination of the soil that the tetanus bacillus exists in the soil (Gilles, 1937). Experiments conducted in our college laboratory proves the existence of the tetanus bacillus in the local soil (N. G. Pandalai, unpublished). At present in civil practice every casualty section of a hospital is well provided with anti-serum which is used freely wherever there is any doubt of tetanus infection after an injury. No case of tetanus has occurred in cases where anti-serum has been given as a prophylactic measure.

It was very difficult to find out the exact period of onset from the patients, as most of them were illiterate. All the cases were acute in type, admitted with rigidity, opisthotonus, and spasms coming every one to two minutes, and in some cases with longer intervals. The degree of acuteness varied slightly from case to case as noted in the statement appended.

Treatment

Prophylactic.—There are two ways of prophylaxis :

- (1) Passive immunization by anti-serum.
- (2) Active immunization by tetanus toxoid.

In King George Hospital, Vizagapatam, doses from 500 to 1,500 units of anti-serum are given as a routine. The active immunization by tetanus toxoid has not been tried. Herman Gold (1937) concluded from a study of 34 adults that active immunization was not suitable in the

present experience of the general practice, except for military practice and some phases of civil practice only. It is proved, however, by Sneath and Kerslake (1935) that the immunity lasts even after 2 years in persons that received 3 doses of tetanus toxoid. Nattan-Larrier *et al.* (1927) found that efficacy of tetanus toxoid in immunization was actually increased if a bacteriological vaccine, such as T A B, was injected at the same time.

Curative.—Various forms of treatment have been recommended. According to H. Meyer and Ransom (1903) and Aschoff and Robertson (1915) the toxin is secreted locally in the infected region and ascends along the lymphatics of the nerve to the corresponding section of the spinal cord to the anterior horn cells. From here it passes through lymphatic spaces to higher centres. A part of the toxin is conveyed by the blood stream and another part is bound and neutralized by tissue cells which are not themselves susceptible to the toxin. Wassermann and Tekaki (1899) have proved, however, that the toxin gets fixed in the brain substance, having a particular affinity for it. An intact nerve bundle is therefore necessary for the spread of this disease. Accordingly prevention of the spread of the toxins was attempted from the original lesion by section of the connected nerve. This method, however, has proved both difficult and unreliable. Leslie Cole (1936) advised intravenous administration of 200,000 units of anti-toxin followed an hour later by surgical treatment of the wound. Abercrombie (1936) from his experience in the Great War was convinced that severe tetanus associated with extensive wounds recovered if treated with large doses of anti-toxin, provided that no surgical interference of the wound was permitted.

Is anti-tetanus serum useful as a curative agent?

Huntington, Thompson and Gordon (1937) analysed 642 cases and found a mortality rate of 65.3 per cent in untreated cases as compared with 58.6 to 66.1 per cent in the treated cases. They concluded that the effect of anti-toxin treatment could not be great. We believe, however, with Yodh and others that anti-toxin treatment is the only rational form of treatment at present available and certainly has helped many cases to recovery. Clinical observation has shown that the anti-toxin is of great value in the cure of spasms of this disease. Case 30 illustrated the effect of the anti-toxin in a boy with local tetanus, who after the administration of 30,000 units was free from spasms, was discharged cured in 3 days' time and has remained perfectly fit. Case 38 received 20,000 units per day in 2 doses intravenously daily. Eight days before discharge anti-toxin administration was stopped; during this period of cessation of the administration of anti-toxin during convalescence severe spasms of the adductors of both hips and flexors of the knee developed causing him severe pain resulting in sleeplessness, even though the

jaw and trunk muscles were perfectly relaxed. On repeating the dose for 2 days more the spasm was relieved and he was discharged cured two days after and he is now keeping perfectly fit.

Intravenous versus intrathecal route.—Weed (1932) has shown that the cerebrospinal fluid comes mainly from the choroid plexus, only a small amount passing out along the perivascular spaces to the sub-arachnoid space. From there it travels through the arachnoidal villi into the venous sinuses. The fluid introduced into the theca will therefore tend to pass into the vein by the arachnoidal villi and will not come at once into close contact with the nervous tissues. All parts of the brain are richly supplied with blood vessels and capillaries. Anti-toxin therefore could reach these nerve cells more quickly when given directly into the vein than if it were first injected into the spinal theca and then absorbed into the venous sinuses through the arachnoidal villi. Florey and Fildes (1927) compared the two routes in rabbits and found that the intrathecal route had no advantage over the intravenous route. Cole and Spooner (1935) studied the fate of injected anti-toxin in 4 patients, each of whom had a single initial dose of 200,000 units. The result of this investigation indicated that 7 days after injection there were 10 units of anti-toxin per c.cm., i.e., a total of 50,000 units still left in the circulating blood and at the end of 14 days between 3 and 5 units per c.cm. Yodh (1937) showed by his experiments on guinea-pigs that in tetanus patients no toxin is found in the cerebrospinal fluid but only in the blood stream. Anti-toxin therefore in the cerebrospinal fluid can only act through its absorption into the blood stream. In intrathecal administration either by lumbar puncture or cisterna puncture (Yodh) there are difficulties in the administration through this route on account of the marked rigidity which is present in these tetanus cases. An anæsthetic therefore is universally required in adopting this method. Moreover, intrathecal administration of serum is not without its dangers. The chief danger experienced by one of the writers (M. G. K.) while working with Colonel (now General) Bradfield in the General Hospital, Madras, was the complication of hyperpyrexia which was fatal in two instances in spite of careful nursing. Having had bad experience with this method, it was not tried in this series even though concentrated serum was available. From a study of the cases recovered and from the experiments of Spooner it becomes quite apparent that injections of large initial doses of the serum are not necessary. The highest daily routine dose was not more than 40,000 units administered morning and evening in two doses by the intravenous route, whenever possible. In four cases 80,000 units per day were given. The average daily routine dose was 20,000 units per day given in 2 doses morning and evening. Large doses in children are not without danger. Two children developed broncho-pneumonia after the administration

(cases 17 and 24). Dufour advocated administration of an anæsthetic, preferably chloroform or ether, for half an hour twice a day to displace the toxin from the nerve cells, and a simultaneous administration of the anti-toxin by the intravenous drip method, so as to prevent the liberated toxin from being absorbed. Fraenkel (1936) suggested surgical treatment of the wound first under general anæsthesia, then a lumbar puncture followed by injection of anti-serum with subsequent elevation of pelvis, and finally injection of the anti-serum subdurally and bilaterally through small trephined apertures over both hemispheres. The idea was to remove as much toxin as possible with the cerebrospinal fluid and replace the fluid with anti-serum which would neutralize the toxin subsequently displaced into the cerebrospinal fluid from the cerebral substance. It is our opinion that it is a drastic form of treatment. Yodh (1937) obtained encouraging results by the combined intrathecal (cisterna route), intravenous, and intramuscular methods. Perfect relaxation is necessary before introducing the needle into the theca to overcome marked rigidity of the muscles of the back, with or without opisthotonus, so commonly found in tetanus cases. While administering a general anæsthetic, such as chloroform or ether, in the induction stage, there is an exaggeration of all reflexes with increased rigidity of muscles; in cases of tetanus it had been the experience of one of the writers (M. G. K.) that this exaggeration of reflexes and rigidity was a distressing feature, causing difficulty in breathing with consequent altered circulation, and was attended with great danger unless great care was taken during the induction stage. Recent reports show that control of spasm by curare and curareine is not without danger of respiratory and circulatory failure.

Our method

In cases where the wounds were still raw no surgical interference was done except the provision of free drainage. Our aim has been not to break the inflammatory barriers but to release pus under pressure and allow air to reach the damaged tissue. A routine administration of 20,000 units per day in two doses morning and evening for adults, by the intravenous route, was the method of choice. In some cases 40,000 units a day and in 4 cases 80,000 units a day were given. From a review of the results, it becomes apparent that these large doses are unnecessary. In some cases where the intravenous route was difficult, the intramuscular and subcutaneous routes were adopted. This administration was continued every day until the spasms disappeared. 10,000 units of anti-serum were drawn into a 20 c.cm. syringe containing normal saline and slowly injected intravenously. On a review of the cases the results show that this simple method is no less efficacious than the methods hitherto advocated. Until now no bad effect has been noticed except in the case of two

children who developed broncho-pneumonia and died after the administration of large doses of anti-toxin. After the experience gained from the tabulated results smaller doses of anti-toxin were used from the beginning of the year 1938.

respectively. The figures show that the mortality rate of our series in which a simple form of treatment by anti-toxic serum and sedatives was adopted compares favourably with those of other workers employing more elaborate methods of treatment.

Mortality rates

	Authors	Yodh's (1937)	Leslie Cole (1937)	John W. Klopp (1936)	Huntington and others (1937)
Cases ..	38	438	30	56	642
Cured ..	19 (50 per cent)	49.4 per cent	56.6 per cent	27 per cent	..
Died ..	18* (47.37 per cent)	50.6 † per cent	43.3 per cent	72 per cent	58.6 to 66.1 per cent

* One discharged at request.

† Including 15 discharged at request.

Sedative treatment.—Chloral and bromides in doses of 30 and 60 grains respectively were given by the mouth in 3 doses daily in adults and correspondingly smaller doses in children. In some cases where it was difficult to administer these by the mouth rectal administration of 4 drams of paraldehyde in 10 ounces of saline by the drip method was substituted. We are completely satisfied with the sedative action of these drugs. The ideal method of treatment of these cases in sound-proof and light-proof room was not possible as no such special accommodation was available.

Results

We believe that it is fallacious to compare results of one group with another. Groups of

Mortality rate excluding deaths within 24 hours

Authors	Yodh (1937)	Leslie Cole (1937)
18.42 per cent	29.4 per cent	22.7 per cent

The ages of 3 patients are not known. The incidence of tetanus appears to be less after 30 years, but the mortality rate is very high after this age.

From the table it will be seen that the shorter the incubation period the worse the prognosis. The best prognosis is after an incubation period of 10 days. The mortality of 77.7 per cent among those cases which gave no history of injury is significant. Our results in this respect are in agreement with those of Yodh.

(1) Incidence of age

	Less than 10 years	11-20	21-30	31-40	Above 40
Number of cases	9	8	9	6	3
Cured ..	5 † (55.6 per cent)	5 (62.5 per cent)	5 (55.6 per cent)	1 (16.6 per cent)	1 (33.3 per cent)
Died ..	4* (44.4 per cent)	3 (37.5 per cent)	4 (44.4 per cent)	4 ‡ (83.3 per cent)	2 (66.7 per cent)

* Two children each aged 7 years died of broncho-pneumonia.

† One of this group was a case of local tetanus.

‡ One was discharged at request and not shown as died. One died after 16 days of dysentery, after complete cure of the spasms (case 9).

(2) Incubation period

	1-5 days	6-10 days	Above 10 days	No history of injury	History of injury available but no history of incubation period
Number	6	7	10	9	6
Cured ..	2 (33.3 per cent)	4 (57.1 per cent)	9 † (90.0 per cent)	2 (22.2 per cent)	2 (33.3 per cent)
Died ..	4	3	1	7	3*

* One died of dysentery after 16 days, after complete cure of spasms. One was 'discharged otherwise' and is not shown among the 'died' cases.

† One case cured was a local tetanus.

cases of the same acuteness must be selected before making any comparison. However, a comparative statement is made showing the respective mortality rates.

One of our patients died of dysentery after progressing 16 days satisfactorily, and two boys died of broncho-pneumonia after 3 and 2 days,

Period of onset

As explained in the earlier part of this paper, the period of onset could not be elicited in our series, as the patients were illiterate and could not give correctly the date of first occurrence of symptoms. Yodh (1937) observes that if the period of onset was 3 days or over there were

greater chances of recovery even with short incubation period. We are not able to testify to this observation, because we could not get this information correctly.

Duration of great prognostic value

Except one case of local tetanus, 37 cases were all acute with generalized spasm, and the patients could give the duration of symptoms. From the time the symptoms started to the time they were admitted into the hospital was taken as the duration and an attempt was made to foretell the prognosis from this. Out of 18 deaths, the duration of 2 cases was not known: of this one patient was admitted moribund and died 15 minutes after admission (a case of cephalo-tetanus). Out of the 16 deaths, 12 deaths were in those in whom the duration was only 3 days or less, which works out to a mortality of 75 per cent. Four cases died with duration of 5, 6, 7 and 8 days, respectively. The mortality rate after 3 days is 25 per cent. Thus prognosis may be said to depend on the duration, being good after 3 days, better after 5 days, and excellent after 8 days.

Economic value of the treatment

With the exception of 2 cases, who received intramuscular injections, the rest of the patients that were admitted were from the poorer classes, whose wage-earning capacity was not more than Rs. 10 (£0-15-0) a month. In adopting the treatment in a general hospital for this condition the cost of anti-serum has to be seriously considered, apart from the question of diet, nursing and medical attendance. It requires on an average Rs. 240-14-5 (£28-10-1) to cure a patient. The highest was Rs. 520 (£39) and the lowest cost was Rs. 55-10-0 (£4-3-5), excluding the case of local tetanus which cost only Rs. 15 (£1-2-6). This is based on the value of anti-toxin which is supplied at Rs. 10 (£0-15-0) for 20,000 units, and the exchange value of one rupee is calculated at Re. 1 = £0-1-6. The average amount of money that was spent on serum on all those that died was Rs. 38-5-4 (£2-17-6). The highest amount spent was Rs. 147-0-0 (£11-1-3), and this was for the unfortunate patient that died of dysentery on the 16th day after recovering from the spasms completely (case 9), and the lowest cost was Rs. 5 (£0-7-6), excluding a case which was discharged on request. It is therefore evident that the cost of treatment of tetanus, even taking only the value of serum into consideration, is very expensive and is beyond the means of the type of patients admitted. The average duration of stay of a patient was 22 days, and the longest period was 42 days. The complications that occurred during the treatment were as follows:—

(1) Difficulty in the administration of diet. In several cases nasal feeding had to be resorted to when the spasms were severe.

(2) Broncho-pneumonia occurred in two cases.

(3) Dysentery occurred in two cases during convalescence, one patient died and one recovered. This was due to giving of unauthorized food by the relations.

(4) Parotitis occurred in one case.

Conclusion

From a review of all the available methods of treatment it becomes clear that to evaluate a treatment in the cure of a disease the following conditions must be satisfied:—

(1) The treatment must be simple and should be capable of being practised by the average practitioner.

(2) Small percentages of improvement in the mortality rate should not be taken as a criterion denoting efficiency in the treatment.

(3) The cost of treatment must be within the means of an average man who suffers from this disease.

Taking all these three conditions together, the treatment of tetanus is still not satisfactory.

Summary

1. A review of 38 cases of tetanus and a study of the principles and modes of treatment was made.

2. A case of local tetanus was described. Among the forms of injuries that followed, three occurred after abortion and two after intramuscular injections. Nine patients gave no history of injury; one was an epileptic.

3. The simple mode of treatment followed by the authors was described and mortality rates compared.

4. In assessing prognosis besides incidence of age, incubation period, and period of onset, 'duration' is suggested to be of great prognostic value.

5. The economic value of the treatment and average period of stay in the hospital was also discussed.

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MAPHARSIDE IN THE TREATMENT OF SYPHILIS—A CLINICAL STUDY

By R. V. RAJAM, M.B., M.S., M.R.C.P.
Venereal Specialist, General Hospital, Madras
and

N. VASUDEVA RAO, M.B., B.S.
Honorary Assistant Surgeon, Venereal Department,
General Hospital, Madras

MAPHARSIDE is one of the latest organic trivalent arsenical compounds introduced in the therapy of syphilis. An increasing volume of literature about its therapeutic and toxic effects has been published, particularly in American medical journals. This drug, whose name is derived from the abbreviations of the initials of the chemical name meta-amino-para-hydroxy-phenyl-arsine oxide, is generally accepted as the actively treponemicidal cleavage product of arsphenamine and neo-arsphenamine. According to the studies of Ehrlich, Bertheim, Voeghtein and others arsphenamine and neo-arsphenamine are not treponemicidal as such, but owe their curative property to their being oxidized in the human body into the actively parasitocidal arseno-oxide. Such a product prepared *in vitro* is mapharside.

Tatum and Cooper (1934) in their experimental studies of mapharside in rabbit syphilis came to the following conclusions:—

1. Mapharside is a pure chemical preparation the purity of which can be determined by chemical methods. The arsphenamines and neo-arsphenamines on the other hand are chemical mixtures and consequently the toxicity and therapeutic values may vary with each batch.

2. The drug is comparatively stable and becomes less toxic on long exposure to air.

3. In rabbit syphilis, the effective therapeutic dose of mapharside is one-fiftieth to one-thirtieth of that required of neo-arsphenamine.

4. The chemo-therapeutic index (ratio of maximal tolerated dose to minimal curative dose) was found to be higher than that of any other anti-syphilitic agent known to them. On these grounds they advocated a clinical investigation in human syphilis. Since then a number of clinics in America with the lead by Foerster and his associates (1935) have reported favourably on this drug in the treatment of syphilis.

Mapharside is a dry, hygroscopic stable powder readily soluble in water. It contains 29.01 per cent of metallic arsenic, approximately the same as that of the arsphenamines. In the proportion of 4 milligrammes per cubic centimetre of distilled water, the solution is isotonic.

The solution is slightly acid and does not undergo any toxic change on standing. This is of great advantage in clinics where a large number of patients have to be injected in succession. The solution on prolonged exposure and agitation for hours may gradually darken. A large bulk dose may be dissolved in the required quantity of distilled water and administered successively to patients over a period of 2 or 3 hours. We have even kept the solution overnight and administered it next morning without any harm, though the therapeutic effect seems to be lessened after 8 hours. In all cases, the drug is given intravenously only. To avoid the occurrence of venous spasm and pain in the arm, the drug after solution is kept standing for a few minutes and should be injected fairly rapidly in 15 to 20 seconds. The effective therapeutic dose of mapharside being much less than that of neo-arsphenamine, a smaller quantity of arsenic is introduced into the body. The adult dose of mapharside varies from 0.04 gm. to 0.06 gm. In the case of females, an initial dose of 0.03 is recommended.

In the venereal clinic of the Government General Hospital we had been using one of the older trivalent preparations of arsenic in the routine treatment of syphilis for a number of years and it is our experience that the tolerance of the average South Indian patient of the poor hospital class to this drug has been unsatisfactory. Toxic side reactions, particularly of the severe and often fatal type, have been more frequently observed than the statistics of European clinics show. We have satisfied ourselves that this increased frequency of toxic reactions to the older preparation is not due to individual dosage, to the interval between injections, or to the total dosage employed. It is well known that neo-arsphenamine preparations vary in their toxicity and therapeutic effectiveness from one brand to another and from one lot to another lot of the same preparation. It is not known definitely what changes these extremely unstable products of varying chemical purity undergo under tropical conditions of storage and usage.

The new preparation, mapharside, was reported to be free from the severe reactions, and was deemed to be equally therapeutically effective, by a number of American medical writers. We decided to substitute mapharside for neo-arsphenamine in the routine treatment of syphilis. A complete evaluation of the drug cannot be attempted in this paper as the material available does not lend itself to satisfactory statistical long range observation and record.

The results published in this article cover a study of mapharside in the treatment of syphilis of adult and adolescent patients of both sexes over a period of nearly a year. Children were excluded from this treatment. Notoriously inadequate treatment is the rule rather than the exception, as the majority of the patients default with the healing of clinical lesions. The tracing of defaulters is a matter of great difficulty.

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False names, false addresses, the ignorance and the apathy of the average venereal disease patient, the fact that more than half the syphilitic patients attending the clinic belong to the itinerant floating population of the city who trek away to their homes in the rural parts of the Presidency and are heard of no more, these constitute and offer insuperable obstacles to any regular follow-up of these patients, the majority of whom probably continue to be in an infectious state. The unsatisfactory state of affairs may be gathered from the fact that in one year from June 1937 to June 1938, 1,000 patients with syphilis had attended the venereal clinic and had received only 5,650 injections of mapharside between them, an average of 5.65 injections per patient. In spite of such handicaps, it is proposed to offer some remarks on this drug with the available records. Of the 1,000 cases of syphilis 798 were males and 202 females. The ages of the patients varied from 14 to 60, the majority being between 18 and 25. The following table gives the classification:—

	Males	Females	Total
Total number of cases ..	798	202	1,000
Primary syphilis ..	227	7	234
Early, secondary syphilis ..	287	51	338
Late benign syphilis ..	73	36	109
Latent syphilis ..	132	86	218
Congenital syphilis ..	3	6	9
Yaws (mostly tertiary) ..	10	5	15
Neurosyphilis (meningovascular) ..	8	1	9
Cardiovascular syphilis ..	1	Nil	1
Total number of injections of mapharside administered	4,382	1,268	5,650

Of the 1,000 cases, only 127 males and 43 females completed one or more courses of injections (one course consisting of 10 injections of mapharside totalling 400 milligrammes). At the commencement of this study, a selected number of patients with syphilis in different stages were admitted into the hospital and treated with mapharside only, in order to assess the spirillicidal, the clinical and the tolerance properties of the drug without the disturbing effect of bismuth. After a satisfactory appraisal of the drug, the combined treatment with mapharside and bismuth was given to almost all the patients in this review. The initial dose for an adult male was 0.04 gm. and 0.03 gm. for the adult female. In a number of male patients, the maximum single dose of 0.06 was tried in the second and subsequent injections and found to produce rather severe minor toxic reactions, such as vomiting, fever, and gastro-intestinal upset and hence, the initial dose of 0.04 gm. or 0.03 gm. was adhered to and repeated in the subsequent injections in most of the patients. In early infectious cases the first four injections were given at 4-day intervals and the subsequent doses once a week.

Spirillicidal effect of mapharside

The effect of a single dose of mapharside (0.04 gm.) was studied in 15 cases of dark-ground-positive primary syphilis. The dark-ground examination became negative to *Spirochaeta pallida* within 18 to 24 hours after the injection in 14 cases. In one case, the spirochaetes did not disappear, though they seemed to be degenerating for 72 hours. The drug therefore is deemed to satisfy one of the important conditions of therapeutic effectiveness, in that it is able to destroy surface spirochaetes in early lesions as rapidly as the older trivalent arsenicals.

Effect on the clinical lesions

The response in 50 cases of primary chancre was noted. The sores healed on the average after 2 to 5 injections. The minimum number of injections required for healing was 2 and the maximum was 9. The response was quicker in the case of primary syphilis with a positive Wassermann reaction than in sero-negative cases.

Forty-six cases of secondary syphilis were observed for their response to mapharside. The eruptions involuted on an average after 3 to 6 injections. The minimum was 3 and the maximum was 10. The pigmentary scars left after the involution of the larger papular syphilides disappeared only very gradually, in the course of a few months, and after 2 or 3 courses of the treatment.

The response of late benign syphilitic lesions to mapharside was equally satisfactory. In this study, 15 cases of tertiary yaws of skin and bone were included and they reacted to mapharside as satisfactorily as syphilitic lesions. Two cases of leuco-melanoderma, a late secondary or tertiary degenerative stigma of syphilis, affecting the palms and soles and parts of the face and the neck, responded to two courses of mapharside and the affected skin assumed almost normal colour and texture. We are reporting these two cases particularly because our previous experience in the treatment of this distressing condition with neo-arsphenamine was very disappointing.

A small number of pregnant women with active and latent syphilis were treated with mapharside with beneficial results. The treatment was continuous throughout the period of pregnancy and many of them stood the therapy extremely well. In two cases, which were followed, live full-term healthy children were born, without any clinical, radiological or serological evidence of syphilis. No cases of early congenital syphilis in infants and children were treated with mapharside. The cases of congenital syphilis included in this study were adolescents, with either stigmata or tertiary manifestations of the infection. In the number included, a few were probably cases of yaws. In these cases, the clinical response of active lesions was as rapid as in those of acquired syphilis.

There were 9 cases of neuro-syphilis, all of them of early meningo-vascular type and neuro-relapses. In this type of case we have found mapharside, as well as the other trivalent arsenicals, distinctly inferior and slower in therapeutic effect to tryparsamide and pyrexial therapy.

Effect on the serological reaction

An accurate evaluation of the drug on the serological reaction of the blood requires long-range treatment and observation, and it is unfortunate that the material available does not lend itself to such a purpose. From the few cases which have had adequate treatment controlled by blood tests, it is inferred that the change in the serology takes place more slowly with mapharside than with older neo-arsphenamine drugs. Far from this being a disadvantage it has the merit of inducing the patient to hold on to the schedule of treatment laid down for a longer period than he would otherwise be tempted to do.

Toxic reactions

The toxic effects of arsenical therapy are usually classified as immediate and minor, delayed and serious. We have attempted below a comparative study of the relative incidence of the toxic reactions by mapharside and one of the older trivalent preparations on 1,000 cases of syphilis in all stages treated with each drug:—

	Mapharside	Neo-arsphenamine
Total number of injections given.	5,650	6,500
Immediate and minor reactions—		
Fever ..	149	64
Headache ..	13	8
Gastro-intestinal upset (vomiting and diarrhoea).	19	5
Nitritoid reactions ..	Nil	8
Fainting ..	5	Nil.
Pain in abdomen ..	1	Nil.
Itching ..	33	67
Mild erythema ..	7	10
Urticaria ..	1	5
Herpes ..	6	12
Herxheimer's reaction	8	2
Vein spasm ..	7	Nil.
	249	181
Delayed severe reactions—		
Exfoliative dermatitis	Nil	12 cases severe and 7 mild.
Jaundice ..	6	10
Encephalitis ..	1 (fatal)	5 (fatal)
Agranulocytosis ..	1 (fatal)	1 (fatal)
	8	35

As has been observed by others, the immediate reactions of mapharside therapy seem to be more frequent than those of neo-arsphenamine. But most of these reactions were mild, evanescent and occur during the first or second injections. During the first two or three months of clinical trial with this drug the maximum dose of 0.06

gm. was administered to many patients as an experimental measure and the larger incidence of immediate reactions may be due to this fact. The absence of nitritoid reactions after mapharside is a special feature to be noted. The cutaneous reactions, itching, erythema, urticaria, herpes were all mild temporary manifestations and treatment was continued with mapharside after a few days or weeks without any recurrence or evidence of increased toxicity. The so-called Herxheimer's reaction or exacerbation of the clinical condition was observed more frequently after mapharside than after neo-arsphenamine and that too only in early syphilis. The occurrence of venous spasm is a unique feature of mapharside therapy and unknown in the treatment with the older drugs. Immediately after an injection, the patient complains of pain shooting up and down the arm and sometimes it is so severe that he cries out. The pain lasts for $\frac{1}{2}$ to 2 hours and is greatly relieved by the application of ice. The venous spasm and the pain can be completely avoided by rapid injection in 15 to 20 seconds and by allowing the solution to stand for a few minutes before administration. When we come to consider the delayed reactions, the distinct superiority of mapharside may be clearly seen. Exfoliative dermatitis, the *bête noire* of the syphilologist, with its weeks of utter misery, ill health, hospitalization and its frequently fatal termination, has been conspicuously absent in the 1,000 cases treated with mapharside in contrast to its high incidence in the other 1,000 treated with neo-arsphenamine.

There were 6 cases of jaundice in the mapharside series, 5 males and 1 female. All the cases were mild and cleared up in 3 to 4 weeks with cessation of the drug and expectant treatment. It is difficult to assess the rôle of mapharside in the causation of jaundice in these cases. The van den Bergh reaction of the blood showed—

Direct immediate positive in 3 cases.

Direct biphasic positive in 2 cases.

Indirect faintly positive in 1 case.

Four cases occurred after 8 injections of mapharside, 2 after 20 injections. As regards the interval between the last injection and developing of jaundice, it was 1 week in 3 cases, 2 weeks in 1 case, 2 months in 1 and 3 months in 1. Four cases of jaundice occurred in the months of April and May, 1 in February, and 1 in July. It is possible that the majority were cases of ordinary catarrhal jaundice and the larger number occurring in April and May might be part of an epidemic of jaundice prevalent in the city.

There were two deaths from mapharside therapy—one caused by encephalitis and the other by granulocytopenia. These unpredictable complications of arsenical therapy have not till now been reported with reference to mapharside. These rare reactions are probably attributable to a personal idiosyncrasy.

Encephalitis

This complication occurred in a male patient, aged 47, with sero-positive primary syphilis. He was given two injections of 0.04 gm. mapharside at an interval of 5 days. Twenty-four hours after the second injection he was admitted with high fever and mental confusion. Within a few hours he became comatose. Examination showed a generalized rigidity of all the limbs, small irregular sluggishly reacting pupils, exaggerated tendon jerks, extensor plantar response, a rapid pulse and hurried respiration. In spite of repeated lumbar puncture, adrenaline injection, oxygen inhalations, etc., the patient progressively and rapidly became worse and expired after 72 hours. A post-mortem examination of the body did not reveal any gross changes except a full and engorged condition of the vessels on the surface of the brain.

Granulocytopenia

This condition happened to a male patient, aged 32, with sero-positive primary syphilis. He was given 5 injections of 0.04 mapharside at intervals of 5 days. Four days after the last injection he was admitted with high fever (104.2°F.) and pain in the gums. Examination revealed swollen, inflamed gum margins. Within 24 hours of admission the mucous membrane of the gums, the mouth, and the throat showed rapidly spreading sloughy ulceration with bad fetor and salivation. A complete blood examination revealed marked leucopenia with no other abnormality. The white blood count was 1,250 with a total absence of granulocytes. The patient looked extremely ill, was unable to swallow or breathe freely. Nuclein injections four hourly campolon daily, and glucose twice daily were administered. The temperature was controlled by hydrotherapy. The patient seemed to rally a bit for 1 or 2 days and then became progressively worse and died of septic pneumonia on the tenth day of admission. There was slight bleeding from the gums and the soft tissues of the neck on either side of the jaw became swollen and infiltrated. He developed a terminal jaundice. One peculiarity we noticed in this case was that, while the clinical condition was getting worse, the daily leucocyte count was showing improvement with the appearance of granular leucocytes. The last total count 24 hours before death was 7,400 with 84 per cent of neutrophil leucocytes. Grave as these complications are, in the treatment of syphilis, they were found to be more frequent with the '914' preparations.

Summary

1. The results of the use of mapharside in the treatment of 1,000 patients suffering from syphilis during a one-year period at the venereal clinic, Government General Hospital, are presented.

2. A complete statistical summary of all the results is not attempted.

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A PROBABLE CAUSE OF THE DIFFICULTY OF TREATING CHRONIC AMOEBIC INFECTION IN THIS COUNTRY

By H. GHOSH, M.B., M.S.P.E. (Paris)

Director, Department of Bacteriology, Indian Institute for Medical Research, Calcutta

COLONEL CHOPRA *et al.* (1934) showed in a paper on the treatment of intestinal amoebiasis that it was an extremely difficult problem to cure amoebiasis completely. Repeated courses of emetine, combined with yatren, stovarsol, carbarsone and kurehi had failed to eradicate amoebæ from the colon. This is a common experience of almost all clinicians

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3. The rapidity of the disappearance of the spirochaetes from surface lesions and the clinical response of the lesions themselves are noted as a measure of the effectiveness of the drug. In these respects mapharside is comparable to the older drugs.

4. The speed of reversal of the serological reaction of the blood could not be accurately assessed, though it is our impression that with mapharside the reversal seems slower than with neo-arsphenamine.

5. A comparative study of the toxic reactions, immediate and delayed, caused by mapharside and neo-arsphenamine is attempted.

6. The immediate minor reactions were more frequent with mapharside than with neo-arsphenamine. With mapharside the nitritoid crises were conspicuous by their absence. There was not a single case of exfoliative dermatitis due to mapharside, and the other delayed reactions were much less frequently observed than with neo-arsphenamine. Two deaths following mapharside therapy are recorded.

Conclusion

Mapharside appears to be a distinct refinement in arsenical therapy over the older trivalent drugs. The drug is of definite chemical composition which ensures a uniform purity in the samples. Its stability and non-toxicity in solution is a great advantage in the mass and institutional treatment of syphilis. The therapeutic unit dose of mapharside is about 1/10 that of neo-arsphenamine preparations, and hence less arsenic is introduced into the body. The drug is less toxic in therapeutic doses and better tolerated. None of the serious eutaneous symptoms of intolerance that occur with the older trivalent preparations have been encountered in the treatment with mapharside.

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who have the opportunity of observing their patients for a long period. One medical man practising in a *mofussil* town told us that a patient of his, suffering from occasional attacks of amœbic dysentery, had five courses of emetine (each consisting of 6 injections of 1 grain emetine hydrochloride, stovarsol, carbarsone, and kurchi-bismuth-iodide) within a period of two years, yet he could not cure the patient. After each course the patient apparently got well but the condition recurred a few weeks after stopping the treatment. The only explanation of such failure so far adduced was that the amœba got resistant to specific chemotherapeutic drugs.

Since our work (Pal and Ghosh, 1937) on the reaction of stools with relation to fermentation in the intestines and subsequent report by Pasricha *et al.* (1938), we began to wonder whether the constantly acid reaction of the stools of the people of this country, who take much rice or flour and sweets, could have any influence in making the amœbæ resistant to treatment by specific chemotherapy. It is generally known that acid reaction of stools favours the life and growth of *Entamœba histolytica*.

On this hypothesis we treated three cases of chronic amœbiasis, whose stools were highly acid to litmus, with one course of 6 injections of 1 grain emetine followed by oral administration of freshly prepared liquid extract of kurchi for 12 consecutive days while the patients were kept mainly on protein diet with a restricted amount of carbohydrate in the form of porridge and *chapati*. The stool turned alkaline after 48 hours. The restricted diet was enforced in each case for four weeks and the patient was advised to test the reaction of the stool daily with litmus paper. The restriction of diet was lifted after four weeks, but the patients were instructed to avoid rice and sweets as much as possible. We explained to them that if the stool turned acid we should not be held responsible for the recurrence of symptoms. Two of these patients had been suffering from fermentation almost every day and occasional attacks of dysentery for a period of three years. Each had two courses of emetine, stovarsol, kurchi-bismuth-iodide, or liquid extract of kurchi with only temporary relief. The other case had had the same complaints for one year and a half and had taken two courses of emetine (each consisting of 6 injections of 1 grain of emetine), one course of carbarsone, and liquid extract of kurchi. This latter patient had chronic staphylococcal eczema on the skin of both legs which disappeared during the previous courses of treatment of amœbiasis but reappeared after a few weeks. One patient has been under our observation for 11 months, one for 8½ months and the other for 6 months. During the period of observation several examinations of the stools of each were made; up to the time of writing all the three patients were free from amœbæ. The patients had been following our instructions regarding diet,

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ON THE INTRA-UTERINE INFECTION OF THE FŒTUS WITH *LEPTOSPIRA ICTEROHÆMORRHAGIÆ*

By B. M. DAS GUPTA

(From the Department of Protozoology, Calcutta School of Tropical Medicine)

OPINIONS differ with regard to the transmissibility of leptospira from the mother to the embryonic guinea-pig. Thus, Costa and Troisier (1916) reported that leptospiræ could penetrate through the placenta as shown by the transmission of infection by inoculation of the amniotic fluid. However, Buchanan (1927) criticized these observations on the ground that the presence of blood in such circumstances cannot be entirely ruled out.

Takagi (1927) found spirochætes in the placenta of guinea-pigs infected with Weil's

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though they said that it was very hard on them to avoid rice and sweets. The general health of all these patients has greatly improved.

Of course, no positive deduction can be drawn from the three cases shown above, but it seems to us that this is a line of investigation worth continuing.

It is, therefore, our suggestion that in treating cases of chronic amœbiasis strict attention should be paid to the adjustment of the diet in such a way as to keep the reaction of the stool alkaline. Rice, sweets and excessive quantity of other carbohydrates tend to make the stool highly acid.

Alkali by mouth can change the reaction of the urine but has little influence on the reaction of stools. Increased meat and fish diet and diminution of the quantity of carbohydrates invariably make the reaction of the stool alkaline. Change to *atta* from rice also changes the reaction of the stool from acid to alkaline.

[Note.—As the writer says 'no positive deductions can be drawn from the three cases'. There are many reasons for this; nowhere is any mention made of the finding of amœbæ in these patients' stools although the cases are labelled 'amœbiasis'. 'During the period of observation several examinations of the stools of each were made' with negative findings, but how many and when? There is therefore neither evidence of amœbiasis nor of its cure. The clinical evidence, however, seems to be clear, though there is nothing to indicate that it was not the change in diet *per se* that caused the improvement. Nevertheless, we consider that this short note is a useful contribution and worth publishing in order to draw attention to an aspect of this difficult problem, the cure of chronic amœbiasis, which has not received sufficient attention hitherto. The diet usually given in amœbiasis would tend rather to increase than decrease the acid reaction of the stools.—EDITOR, I. M. G.]

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disease, but the organisms could not be detected in the foetuses. It was found that the spirochaetes had been taken up by ciliated cells and other tissues on the outside of the embryo which seem to protect the foetus from the invasion from the maternal body.

Hiyeda (1927) records a case of abortion of a 4-months-old foetus by a woman suffering from Weil's disease. Although leptospiræ could not be detected in the tissues of the foetus, yet the author argued that the foetus had been infected.

Saenz (1929) inoculated a pregnant guinea-pig with leptospiræ and 5 days later removed the placenta and the foetus. The guinea-pigs inoculated with the emulsion of the foetus and placenta died of leptospiral infection after 7 and 13 days, respectively. A second guinea-pig was infected 6 days before the birth of 2 young ones both of which showed definite evidence of leptospiral infection.

With a view to arriving at a solution to this controversial problem 7 guinea-pigs in varying stages of pregnancy were inoculated each with 3 c.cm. of a virulent culture. One animal in an advanced stage of pregnancy gave birth to 2 live and well-developed young ones about 30 hours after the infective inoculation. Peritoneal fluid and blood of these young ones were examined at birth and thereafter once a day for 5 days. The results were always negative, but on the 6th day the peritoneal fluid of both showed the presence of leptospiræ and they died on the 8th day after their birth. The second guinea-pig showed no evidence of infection and delivered 3 healthy young ones a week after the inoculation. The mother and offspring remained alive and well for more than 4 weeks, far beyond the usual fatal period. Guinea-pigs nos. 3 and 4 delivered dead immature young ones on the 5th and 6th days, respectively, after inoculation. The histopathological examination of the foetal tissues (liver and kidneys) was negative, but the guinea-pig inoculated with the liver emulsion of one of the young ones of no. 3 animal died of leptospiral jaundice, the organisms being present in large numbers in the liver and kidneys.

The remaining 3 expectant mothers were sacrificed when leptospiræ were detected in their blood. In one, although the presence of the organisms could not be demonstrated in the foetuses by direct microscopical examination of the liver and kidney emulsion or by the examination of the sections of these organs, yet inoculation of the liver emulsions produced fatal leptospiral infection in the guinea-pig, as in the case of the guinea-pig no. 3. In order to be sure that these foetuses were not infected with the mother's blood during their removal from the uterus the following measures were adopted:—

On opening the amniotic sac of guinea-pig no. 5 the foetus was carefully removed, the cord was ligatured and the foetus was immersed in a bowl of lysol lotion (1:100) for 5 minutes so that contamination with the mother's blood, if

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A NEW METHOD FOR THE DETERMINATION OF SMALL QUANTITIES OF COCAINE IN PRESENCE OF NOVOCAINE

By RAI BAHADUR K. N. BAGCHI

H. D. GANGULI

P. N. MUKERJEE

and

J. N. BANERJEE

(Department of Chemical Examiner to the Government of Bengal, Calcutta)

THE smuggling of cocaine is carried on on a large scale in spite of the vigilance of the excise department and frequent convictions of the smugglers. The cocaine addict, however, very seldom gets a pure salt of cocaine from the smuggler who invariably adds to it all sorts of adulterants, viz, boric acid, earbonate and bicarbonate of soda, lime, chalk, aspirin, anti-febrin, and starch. Lately, novocaine has been introduced in the field and has become very popular with smugglers on account of its deceptive appearance and somewhat similar, although transient, physiological effect on the tongue. The samples of cocaine seized by the excise and police officers and sent to this department for analysis are found to contain a very high percentage of novocaine and in some samples no

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any, could be eliminated. The foetus was next washed in several changes of sterile saline. The liver and kidneys were removed and the emulsions of these organs were examined under the dark-ground illumination with negative results, but a young guinea-pig inoculated with 1.5 c.cm. of this emulsion died of leptospirosis 8 days later.

Of the two remaining pregnant animals, especially the one which showed a fairly heavy infection of the blood, the presence of leptospiræ was demonstrated in the sections of the foetal liver.

Conclusion

Young guinea-pigs born 30 hours after the infective inoculation of the mother showed no evidence of infection at birth. The infection at a later period was apparently acquired by association with the infected mother. Definite evidence of the transmission of leptospiræ from the mother to the embryonic guinea-pig has been obtained, and is shown by the presence of the organism in the sections of the foetal liver; the work of Saenz is thus supported.

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cocaine at all is detected. As novocaine does not find a place in the schedule under the Dangerous Drugs Act promulgated by the Government of India in 1930, its import, sale and use as an adulterant of cocaine are not restricted. Addicts are unable to detect the fraud and mistake it for cocaine. The small powders containing about 3 grains of a white stuff, supposed to be cocaine hydrochloride and put on sale by the underlings of the smugglers, sometimes contain only novocaine although the fabulously high price of cocaine is charged all the same. Addicts, or cocaine eaters as they are called, often spend a considerable amount to obtain an adequate dose of cocaine for producing the desired effect but in fact they take novocaine mixed with a trace of cocaine, or only novocaine which never produces the same feeling of exhilaration and 'sense of happiness and well-being which transport at once to a longed-for elysium', Brundage (Lyon, 1935), as they expect from cocaine hydrochloride. In this way they go on consuming a large quantity of novocaine, sometimes with a fatal result. In the annual report of this department (Bagchi, 1938) the case of an addict who spent seventy rupees (about five guineas) in one evening to get the full dose of cocaine and then died of novocaine poisoning in about five hours was reported last year. Perhaps many more cases of this nature suffer the same fate but are never brought to light.

In trying these cases of illicit sale of cocaine, the magistrates want to know the amount of cocaine salt actually present in an adulterated sample. The determination of a small quantity of cocaine in the presence of novocaine is difficult and no satisfactory method of analysis is available in the literature. Several methods of detection of cocaine in the presence of novocaine have been described by Young (1931), Wagenaar (1932), Sanchez (1934) and others, but none of those methods could be suitably modified for quantitative determination of cocaine according to our requirements. Riley's method (1935) is too cumbersome and Nicholls' method (1936) does not work well with much excess of novocaine. A new method was worked out in this department and was given a fair trial for a sufficiently long time with satisfactory results, and we believe that it is at present the best method for the determination of a cocaine salt in the presence of even a large excess of novocaine. The method works equally well in the presence of other adulterants stated above and is based on the facts that gold chloride gives a crystalline precipitate with both cocaine and novocaine and that the novocaine gold chloride compound is soluble in dilute hydrochloric acid while the cocaine gold chloride compound is insoluble in the same acid.

Method of carrying out the determination

Preliminary test.—A preliminary examination as to the actual constituents of the powder is desirable. The characteristic fern-like crystals (Stephenson, 1921) produced by gold chloride

will indicate the presence of cocaine. The crystals are obtained even in dilution of 1 : 20,000 (Allen, 1929). The number of crystals found in three or four consecutive fields of the microscope is likely to give an idea about the amount of cocaine present in the mixture. The presence of alkaline carbonate and other adulterants is also to be tested by the usual method.

Actual experiment.—About 0.5 gramme of the sample accurately weighed is dissolved in about 20 ml. of dilute (10 per cent) hydrochloric acid (B. P.) in a small beaker. About 2.5 ml. of one per cent gold chloride solution are added drop by drop to the acid mixture until the precipitation of cocaine gold chloride is complete. During addition of gold chloride solution the mixture is stirred and the sides of the beaker are scratched with a glass rod for rapid precipitation. The yellow precipitate of cocaine gold chloride is at first amorphous but soon becomes crystalline and begins to settle. In about two hours it settles completely and is then filtered through a small filter (Swedish paper no. 00). The residue is carefully washed with about 15 ml. of cold water (5 portions of three ml. each) till the filtrate is free from novocaine as indicated by a drop of paradimethyl-amino-benzaldehyde solution (one gramme in 95 ml. of absolute alcohol and 20 ml. of concentrated hydrochloric acid) which gives a yellow coloration with novocaine (Chakravarti and Roy, 1937). The residue is then washed with 20 ml. of water into a separating funnel of about 50 ml. capacity by perforating the filter. The mixture is rendered strongly alkaline with 10 per cent solution of ammonia which decomposes the double salt and liberates the cocaine base. The free alkaloid is then extracted with peroxide-free ether (anaesthetic ether B. P.) using 25, 20, 15, 10 and 5 ml. portions. After the final extraction the solution is tested with a drop of Meyer's reagent to see if the alkaloid has been completely extracted. The first two ether extracts are washed with 5 ml. of distilled water and transferred to a tared platinum crucible. Each of the remaining three ether extracts is also washed with the same wash water and is combined with the first two portions in the platinum crucible. Finally, the separator is washed with a few ml. of ether which is then shaken with the wash water for extraction of the last trace of the alkaloid. The greater part of the combined portions of ether is evaporated on a steam-bath and the remainder is evaporated spontaneously at room temperature. The platinum crucible is then transferred to an air oven and dried at about 70°C. to a constant weight. The weight of the alkaloid (cocaine base) multiplied by the factor 1.12 gives the amount of cocaine hydrochloride actually present in the sample.

For confirmation of the above result the dry alkaloid in the platinum crucible is dissolved in a few ml. of neutral alcohol and then 20 ml. of 0.02 N H_2SO_4 are added and the solution is titrated with 0.02 N NaOH using methyl red as

an indicator. One ml. of 0.02 N H_2SO_4 consumed is equivalent to 0.00679 gramme of cocaine hydrochloride.

Precautions

(1) The amount of gold chloride solution usually required for complete precipitation is about 2.5 ml., but the actual amount depends upon the quantity of cocaine present in the mixture. If it is present in excess and novocaine in small quantity, more gold chloride (3 ml. or even more) will be required. It should always be present in slight excess to ensure complete precipitation.

(2) The amount of acid to be added depends upon novocaine present in the sample. If there is less acid there will be a brown coloration due to the reduction of auric chloride. A slight excess of acid is therefore necessary to prevent the reduction of gold chloride and also to keep novocaine in solution. It is desirable not to increase the bulk of the mixture. Ten ml. of 20 per cent acid is preferable to 20 ml. of 10 per cent acid.

(3) For washing the residue in the filter, smallest quantity of water is to be used, as cocaine gold chloride is slightly soluble in water.

(4) The presence of chalk, antifebrin, aspirin, starch, etc., along with novocaine does not interfere with the determination. They are easily removed from the solution by a preliminary filtration, but the presence of alkaline carbonates and lime necessitates the use of stronger (20 per cent) hydrochloric acid. In other cases 10 per cent acid is quite good.

(5) As gold chloride is soluble in ether it is desirable to perform a blank experiment with all the reagents as employed in the different stages of the method and the figure obtained by this way should be deducted from the final weight of the alkaloid.

(6) A tall platinum crucible or a small pyrex beaker should always be used for evaporation to prevent loss by creeping during evaporation.

Results

No.	Amount of cocaine HCl (taken in gramme)	Amount of novocaine present in the mixture (in gramme)	Amount of cocaine HCl recovered (in gramme)	Amount of cocaine HCl obtained by titration (in gramme)
1	0.12	0.5	0.123	0.119
2	0.10	0.5	0.095	..
3	0.05	0.5	0.0497	0.0509
4	0.05	1.0	0.0497	..
5	0.03	0.25	0.0296	0.0298
6	0.03	1.0	0.0295	..
7	0.02	0.5	0.0199	..
8	0.02	1.0	0.0197	0.0197
9	0.02	0.5 with 0.3 g. of $NaHCO_3$	0.0197	0.0203
10	0.01	0.5 with starch	0.0098	0.0098
11	0.01	0.25	0.0099	0.0102
12	0.005	0.5	0.0045	..
13	0.02	0.2 with 0.5 g. of acetanilide.	0.0197	0.203

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FURTHER OBSERVATIONS ON LEPTOSPIRAL INFECTIONS IN CALCUTTA

By B. M. DAS GUPTA

(From the Department of Protozoology, Calcutta School of Tropical Medicine)

It has been shown in a previous communication (Das Gupta, 1938) that the cases of leptospiral jaundice described in Calcutta were all infected with the organism of the same serological type, being identical with a classical Dutch strain.

Since then more cases have cropped up, one of which is quite important in that the infecting organism belonged to a different serological group and the laboratory confirmation would not have been possible had not the serum been tested with several strains isolated in other parts of the world. A note on this case is published so that it may serve as an object-lesson to other workers engaged in the study of this disease.

The patient showed nearly all the important clinical signs of typical Weil's disease, such as hæmorrhages, intense jaundice and signs of renal irritation, and died within a few hours of admission. He was seen on the sixteenth day of illness, i.e., at the time when the infective period of the blood was over. Blood was, therefore, taken for serological tests alone. As the serum did not give any significant reaction with the local strain, nor did it protect young guinea-pigs against the same strain, a little of it was sent to the Schüffner laboratory at Amsterdam with the request that the test might be performed with all the strains in its possession. The results of

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Indian Medical Gazette

JANUARY

MEDICAL EDUCATION AND RURAL MEDICAL RELIEF

At the end of last year the Director-General, Indian Medical Service, published a general review of the medical services in India*. It is surprising that this has never been done before and, now that we have this volume beside us, we begin to wonder how we managed to get on without it, for it contains a ready answer to so many questions that in the past would have necessitated searching through numerous provincial reports and to others that could only have been answered by personal enquiry.

To people in India interested in medical education, medical relief, or preventive medicine (who amongst the intelligentsia of the country are not, or should not be?) this volume will be invaluable, but to those in foreign countries who are similarly interested, perhaps for no better reason than to make a comparative study with the medical problems in their own, it will be a revelation; they cannot fail to be impressed with the immensity of the problems, the multiplicity of the means by which they are being met, and, alas, the huge gaps that still exist in the medical organization of this country.

The *Review* is a dispassionate statement of facts: it is neither a eulogium of the various governments' efforts, nor propaganda by the medical department for the consumption and encouragement of legislators. Critical comparisons between the states of affairs in different provinces are avoided, but it will be a good thing for each province to be able to see where it fails in comparison to other provinces, as it would have been to see where they all fall short, had comparative figures been given from some advanced western countries.

The limiting factor is of course in nearly every case finance. It would be absurd to suggest that the medical organization of this country was perfect and that the best possible use was being made of the money available, just as it would be to suggest that no more money could be spared for the medical services by the central and provincial governments. But, on the other hand, there is no obvious waste of the funds allotted, nor do the contributions from governments compare, on the basis of the percentage of total resources, at all badly with those made by other governments to the medical services of

their own countries. It is probably in the inadequacy of the provision made for medical relief by local bodies, in the rarity of bequests by wealthy philanthropists, and in the poorness of the charitable contributions by the people themselves that India falls so far short of western countries.

Perhaps the most interesting chapters in this review are those on medical education and rural medical relief, subjects which are intimately connected. The state of education in the medical colleges in India must on the whole be considered satisfactory; the preliminary education required to qualify for admission is high enough to ensure that the majority of the candidates are of the right standard, and the length of the course and the facilities for teaching are such as to allow the outturn of graduates with a medical education that compares well with those of the universities of other countries. There is one aspect of the medical college question that attracts our attention, and that is, provincial bars to the entrance of students. The state of affairs has been unsatisfactory in the past and with the establishment of the new provinces it will become worse. It is very natural that a native of one of the smaller provinces should feel acutely disappointed when he finds that he can only become a medical graduate by paying an exorbitant fee to gain entrance to a foreign (provincially speaking) medical college, and then only if he is very lucky. Such a disability will naturally lead to a demand for a medical college in each province. To attempt to meet such a demand in some provinces is out of the question and in others would be most unfortunate; the time for multiplying medical colleges in this way has not come. At present there are nine medical colleges distributed between six provinces, excluding the medical college for women at Delhi, which is mainly supported by the Government of India, so that in nine provinces, including the Central Provinces, Assam, Sind, Orissa and the North-West Frontier Province, there is no medical college.

It is suggested that the question of establishing a medical college on an all-India basis at Delhi or elsewhere should now be considered. The present inequality could, however, be rectified immediately by the richer provinces opening their doors a little more widely to 'foreign' students from the poorer provinces, only we are afraid that the spirit of provincialism too often outweighs that of nationalism, and that inter-provincial generosity of this kind is too rare for us to entertain any great hopes of an easier solution of the problem on these obvious lines.

If the state of medical education at the medical colleges can be considered satisfactory, that at the medical schools in India cannot. A previous Director-General laid down a standard for medical schools, based on the number of patients available for teaching and on the equipment of the institution. The standard cannot be

* *An Indian Medical Review*. By Major-General E. W. C. Bradfield, C.I.E., O.B.E., K.H.S., I.M.S., Director-General, I. M. S., 1938. Published by the Manager of Publications, Delhi. Pp. 658.

considered a high one, yet of the 27 medical schools in India, only one conforms to this standard, eight are deficient in two out of three points and eighteen are deficient in all three points.

Among the licentiate class of practitioner there are many men who in knowledge and efficiency are far above the average of the graduate practitioner and there are probably some graduates who would compare badly with the average licentiate, but it stands to reason that the ill-equipped and over-crowded medical schools in India must lead to the turning out of many men with a standard of medical education far below what ought to be considered the minimum standard for doctors qualified to practise scientific medicine. Judged from any point of view the production of a class of sub-standard medical men must be considered most unsatisfactory.

How can it be remedied?

There are two courses open, one to raise the standard of these schools, the other to close them down. In many instances it should undoubtedly be possible to raise the school to the requisite standard, but this would probably mean a stricter limitation of entrants. In any case any widespread reform in the medical schools will mean a much smaller output of qualified medical men.

Will this be a satisfactory result?

There is already considerable unemployment amongst medical men and this measure might assist in reducing the ranks of the unemployed, but on the other hand the rural areas want medical relief and the better their education the less willing will medical men be to bury themselves in the country, so that again we come to an impasse.

Whatever is to be the solution of rural medical relief it does not seem to us that the production of a large body of substandard medical men will provide the answer. There should be one standard only for medical qualification in this country; this ideal cannot be achieved by a stroke of the pen and the admission of medical men of all standards to one register, but will only be attained by raising the standard of education of the licentiates to the level of that of the graduates.

The number of the population served by each hospital or dispensary varies in the different provinces from 11,305 (Baluchistan) to 81,087 (United Provinces) and in the large provinces the average is about 50,000. The average area served varies from 24 square miles (Delhi) to 1,327 square miles (Baluchistan) and the average in the larger provinces is probably in the region of 250, though in Bengal it is 540 square miles. If the larger towns, where each hospital serves a much smaller area, are excluded the average area served by each of the remaining hospitals or dispensaries will be greater.

In most rural dispensaries there is one medical officer who has to serve an area with a radius of 10 miles approximately and a population of 50,000 persons. The monthly expenditure in rural dispensaries varies considerably but on the average it is certainly less than Rs. 200 in most provinces; this after the deduction of salaries leaves remarkably little for drugs and equipment.

There is again in the different provinces a considerable variation in the *per-capita* cost of medical relief. In 1936 it varied from Re. 1-2-5 in Delhi to one anna in the United Provinces, in Bengal it was Re. 0-2-1, and in the Punjab Re. 0-5-7, the highest figure in the larger provinces. Whatever schemes for rural medical relief are adopted, it is quite certain that no satisfactory solution will be found in some provinces unless more money can be devoted to this purpose.

Money, however, is not the only difficulty and even with a generous dispensary and travelling allowance a doctor would find it difficult to serve so large an area without assistance of some kind. The establishment of subsidiary 'consulting rooms' in a number of villages which he could visit in rotation has been suggested, but these would be of little use unless they had dispensaries (in the stricter sense) where at least stocks of the more commonly used drugs could be kept.

The question of unqualified assistance, that is the employment of some educated person in the village (e.g., the schoolmaster) to give 'first aid', then comes up. The objection raised against this is that in time such a person 'is too inclined to set himself up as a fully-qualified doctor to the general disadvantage of the village'. We do not like this argument. It is suggestive of petty resentment at any possible encroachment on our professional reserves, and the jealous guarding of trade secrets. An unqualified person given an official position in a village should of course be strictly limited in his activities and any attempt on his part to assume the title of doctor should lead to the cancellation of his official status, but there is nothing to prevent anybody practising the healing art, as long as they limit their dispensings to medicines whose actions they understand and to simple empiricisms, and their surgical practice to the antiseptic dressing of wounds and possibly the opening of superficial abscesses. Were a qualified doctor placed in a similar position with the same limited scope, medicines and equipment, he would probably very soon sink to the level of the first-aid-trained schoolmaster. The more serious aspect of this is that he would then lower the status of the qualified practitioner of scientific medicine in the eyes of the people; they would see no difference between the qualified and unqualified dispenser of medicines. The village practitioner of indigenous medicine, if he were the genuine article and not an opportunist without traditional training, might be better than either of them, as he has been

trained to make use of local resources, when dispensary stocks are low, which they almost invariably are.

At the present time the villager with fever may have to walk 10 miles to get his dose of quinine, or, even if the system of touring the villages were introduced, to wait a week or more. Wouldn't it be better to have some responsible person locally who could give him cinchona mixture on the assumption that it was malaria and later if necessary advise him to see the doctor when he visits the locality, even at the risk of this person occasionally usurping the position of the doctor? The unqualified assistant

would be placed under the orders of the doctor, who, with his far more extensive medical training and wider scope in his position as doctor in charge of a comparatively large area, should have no difficulty in maintaining his status in the eyes of the villagers.

Everything should be done to increase the margin between the qualified and unqualified practitioner, but only by raising the status of the former, so that in time the people are led to appreciate the advantages of scientific medicine, when they will themselves demand, and find the money to support, a far larger body of rural practitioners.

Special Articles

NUTRITIVE VALUE OF RICE

By A. SREENIVASAN, M.A., D.Sc., A.I.C.
(Indian Institute of Science, Bangalore)

RICE is the staple cereal food of more than half the world and of the vast majority of the population in India and in the East in general. There are several hundreds of varieties already in existence; dozens of new ones are being added each year by the breeder. Improvements in rice culture have been hitherto only along the lines of increasing yield and other qualities that enable the cultivation of a successful crop. Very little attention has been directed towards evolving nutritively superior varieties.

In spite of the bewildering number of rice varieties, the consumer is not often at a loss in choosing his desired quality. It is not always, however, that his choice is also the best from the nutritive point of view. The consumer bases his preference only upon popular impressions gained from general experience. There is no foundation for the frequently expressed opinion that rice, in spite of its extensive use, is a poor article of food, for it is possible, under certain conditions, to enhance greatly the food value of rice as ordinarily consumed.

Chemical composition of rice varieties

The chemical composition of rice has been determined by a number of workers (*vide* Sadasivan and Sreenivasan, 1938) and it has been stated that the average values for the different constituents, such as the proteins, fats, carbohydrates and mineral matter, fall within a fairly close range. However, recent work in the writer's laboratory has shown that the composition is more variable between varieties than has hitherto been supposed. Thus, proteins vary from 7 to 11 per cent, phosphoric acid from 0.6 to 1.2 per cent and lime from 0.06 to 0.11 per cent. Of especial significance has been the observation that coloured and coarse-grained rices generally contain larger amounts of proteins and minerals, particularly phosphorus,

calcium and iron, than the so-called 'superior' fine varieties, which are most favoured by consumers. The coarse varieties have to be polished to a higher degree than the fine ones before a white grain results; they also do not usually possess good milling qualities (Sreenivasan *et al.*, 1938); hence, it follows that under ordinary conditions of milling, the extent of loss of essential constituents from such rices is less than from the fine white rices. That coloured and coarse varieties contain thicker bran layers has also been shown from histological examination of rice varieties (Ramiah, 1936). It has been stated (Kennedy, 1924) that wild rice has a greater food value than cultivated (fine) rice, the proteins being of better quality and the content of vitamin B₁ greater.

Effect of manuring and duration of crop on composition

Improvements in the quality of rice by increasing the protein and mineral contents of the grain can be effected by judicious control of fertilizer applications. In particular, application of fertilizers in instalments during the life of the crop and up to the flowering period is definitely favourable, the protein content being increased in one instance to the extent of 20 per cent. In field behaviour, it has been experienced that the yield is also improved by such applications (Paddy Specialist, Madras, *private communication*).

It is generally believed that short-duration varieties of rice are poorer in quality than the long-duration ones. Thus, in Madras the *kar* varieties are not valued so much for their nutritive value as the *samba* ones. Similarly, in Bengal, *aus* rice is held inferior to the *aman* rice (Acton and Chopra, 1925). Recent researches by the author show that there are many short-duration rices which are richer in composition than the long-duration ones. The results of experiments on the quality of the proteins of pure strains of *aus* and *aman* rice (Basu and co-workers, 1935, 1937) have revealed that the

latter are probably better. More extended experiments are needed to show whether there is any scientific basis for the popular belief in regard to short- and long-duration varieties.

Dry and wet cultivated rices

Rice is essentially a wet crop but there are some dry varieties grown in certain parts of the country and are valued as such. Sir R. McCarrison (1928) showed that they are more nutritious than the wet cultivated rices. More recent work by the writer does not entirely support this view. When the same variety is grown under dry as well as wet conditions, the latter contains greater percentages of protein and mineral matter and promotes better growth in animals. The development of the bran layers is also more in this case (Paddy Specialist, Madras, *private communication*). Irrigated rice is also the more productive, yielding nearly three times as much as the dry crop.

Growth experiments with rice varieties

Extensive feeding experiments on young albino rats and pigeons have been carried out with the different varieties of rice. The differences in growth rate obtained with the varieties are essentially related to their composition. The weekly average increases in weight for the different groups range approximately between 4 and 6 to 7 grammes with the different varieties. There is no doubt that, other things being equal, the variety of rice which contains the greater amounts of albuminoids and minerals, such as phosphorus, calcium and iron, is the more valuable. The present popular favour is, however, as already observed, for the fine-grained varieties which are deficient in nutritional factors. The reason for this anomaly is not far to seek. The plant breeder has only been catering to the popular demand for the fine and high-yielding varieties. Nutritive value has yet no place in his scheme. The result is that he has gone on selecting varieties which are mainly starchy and poor in other ingredients. If, on the other hand, the public awaken to the situation and demand nutritively superior varieties, the position will no doubt soon be reversed.

The proteins of rice

The average protein content of rice is rather small compared to that of other cereals. Still, rice protein is highly nutritious and contains all the essential amino-acids (Hamada, 1923). In its general amino make-up, it has been compared to the majority of the proteins of meat, milk and soya beans (Mitchell and Villegas, 1923). Rice protein has a high biological value (86), higher than that of wheat (67) (Mitchell, 1924, Mitchell and Carman, 1924). For the maintenance of nitrogen equilibrium, rice protein is superior to wheat protein and appears to be as efficient as animal proteins (Basu and Basak, *loc. cit.*). These should justify the extensive use of rice as an almost exclusive article of diet in spite of its

somewhat low protein content. Recent work at Bangalore has shown that the biological value of the proteins of rice in a mixed diet is greatly increased by the addition of supplements of calcium (Ranganathan and Rau, 1938). Addition of skimmed milk or calcium lactate has also been shown to enhance greatly the nutritive value of a rice diet (Wilson, *et al.*, 1936; Aykroyd and Krishnan, 1937).

Calcium and phosphorus in rice

Rice is notoriously deficient in calcium but it is a very good source of phosphorus. The phosphorus occurs mostly as phytin in organic combination (Rather, 1918) and in this form is not easily assimilable by the animal organism (McCance and Widdowson, 1935; Lowe and Steenbock, 1936). This point is of some significance in connection with the production of rickets resulting from excessive cereal consumption (E. Mellanby, 1925; M. Mellanby, 1929; Bruce and Callow, 1934). The availability of phosphorus in rice can however be increased in a number of ways. The ratio of calcium to phosphorus in a diet is an important factor affecting their availability in nutrition. In rice, this ratio is approximately 1:10, a proportion not well suited to the needs of the animal body which are better met by a calcium-phosphorus ratio of 1:1 or 2 (Sherman, 1937). Hence, supplements of calcium in the form of milk, vegetables and other food articles will favourably influence the assimilation of the phosphorus compounds of rice. Vegetables in particular contain more calcium than phosphorus (Ranganathan *et al.*, 1937) and have therefore an unbalanced mineral ratio just opposite of that in rice. The addition of vegetables to a ration containing rice would naturally balance the mineral ratio. Vegetables are also a good source of *phytase* which hydrolyses and renders available the phytin of rice. Rice itself contains this enzyme in a small concentration (Giri and Sreenivasan, 1938) and it is possible, under suitable culinary conditions, to increase greatly the availability of the phosphorus and other minerals in rice. The possible presence of a *phytase* in the intestines of human and animal organisms has been the subject of numerous recent inquiries (*cf.* Patwardhan, 1937), but the evidence is yet largely inconclusive.

Superior nutritive value of parboiled rice

During recent years, a considerable amount of attention has been drawn to the high antineuritic and nutritive value of parboiled rice even after some polishing (Braddon, 1911; Fraser and Stanton, 1910, 1911, 1914; McCarrison and Norris, 1924; and others). The scientific basis for this remained rather obscure until it was shown by Aykroyd (1932) that during the process of parboiling, the endosperm absorbs vitamin B₁ at the expense of the germ and pericarp and that polishing does not therefore remove the vitamin to the same extent as with

the untreated rice. More recent work by the writer has shown that there is a similar absorption of the proteins and minerals as well from the integuments by the endosperm (Sreenivasan *et al.*, 1938). Furthermore, parboiled rice of commerce is often prepared only out of the coarse (rich) varieties of rice which do not mill well when raw. Another point of interest in this connection is that, being less easy to polish than raw rice, parboiled rice is generally undermilled.

Commercial parboiled rice has often a flavour to which some object and also an unattractive appearance. These are due to bad water being used over and over again during the preliminary process of steeping (Charlton, 1923) and can certainly be improved; indeed, ideally prepared parboiled rice has a very pleasing flavour and nearly white appearance. The superior nutritive value of parboiled rice together with its other desirable qualities (Sreenivasan and Das Gupta, 1936) should make the production and use of this article more extensive than hitherto.

The polishing of rice

Until a few decades ago, rice was almost entirely hand-pounded. The resulting grain was necessarily somewhat dull-coloured. With the march of progress from primitive to modern conditions and with the introduction of cheap and more efficient machine-milling, there has been a rapid disappearance of the traditional methods of stone-grinding and hand-hulling with the result that to-day unpolished rice is a rare article for which a special price has to be paid.

In considering the nutritive value of rice, the feature of outstanding importance is the high concentration of essential nutritional factors in the peripheral layers of the grain. The outer envelope or bran and the germ together constitute over a sixth of the whole grain, the remainder being the endosperm of polished rice. They contain more than half to three-fourths of the mineral matter of the grain, over 25 per cent of the protein and practically all the vitamins and fat (Sreenivasan *et al.*, *loc. cit.*). These are the very portions that are lost during milling. In spite of this recognized loss which the grain suffers during polishing, there has been a general and widespread preference for the milled rice. Why is this? The reasons are that polished rice has a pleasing appearance and texture, it cooks more easily than the unpolished grain and digests better and, in the raw condition, it has far better keeping qualities and can be stored easily for long periods without any appreciable deterioration.

Keeping quality of shelled rice

Shelled, unpolished rice undergoes rapid and almost day to day deterioration. The outer coats of the grain contain an enzyme capable of splitting the rice oil. Under the action of moisture and this *lipase*, the bran is easily decomposed, resulting in the production of free fatty acids and other rancidity changes. Polishing

results in the removal of a major part of the rice fat and of the fat-splitting ferment. Hence polished rice has a much better keeping quality. This quality is the one which appeals to the largest section of both producers and consumers. It is in fact the chief reason that militates against the introduction of any major legislation to check the wholesale replacement of unmilled rice by the milled product.

Desiccation combined with air-tight packing or storage in presence of carbon dioxide gas can be successfully employed for the preservation of unpolished rice but concerted search for other cheap and efficacious methods should be made.

Digestibility of unpolished rice

There is a general impression that unpolished rice is more difficult to digest than the polished rice. While it is true that the bran constituents are comparatively more difficult of digestion, yet the difference in digestibility between unpolished and polished rice is too small to be of any significance in practice (Sreenivasan and Giri, not published). Unmilled rice is richer than the milled rice and should therefore be eaten in smaller quantities.

Mode of preparation of rice

Repeated attention has been drawn to the wasteful processes of washing rice before cooking and of throwing away the water in which the rice is boiled during cooking (McCarrison and Norris, *loc. cit.*; van Veen, 1933, 1934; Rudra and Bagchi, 1933; and others). Happily, there has been some improvement in regard to the latter, for, in most well-regulated households, only enough water is used to enable the rice to cook to its proper consistency; where a certain excess of water is used, this is frequently fed to cattle and not thrown away. The losses on washing which are even more wasteful (Sreenivasan, *et al.*, *loc. cit.*) are less well recognized. Washing is perhaps necessitated on account of certain extraneous articles being used as glazing materials to rice. It should be possible to prohibit by proper legislation the use of non-food articles for coating bazar rice so that rice can be cleaned before cooking by some process of dry cleaning.

Need for changed outlook and propaganda

It has been stated often that wheat is more 'health-sustaining' than rice. If the comparisons be made on the basis of identical dietary proportions of the whole grains of either wheat or rice, no evidence can be adduced to justify our placing the one in a higher nutritional category than the other. It is true that wheat is generally richer in regard to proteins, but rice protein is much more nutritious. Besides, there are certain varieties of rice which compare favourably with wheat in this respect. Further search will perhaps reveal varieties which are nearly as rich as wheat in composition. It is also possible to enhance the nutritive value of rice by suitable

systems of manuring and by alterations in food habits. The poor quality of the food as ordinarily eaten is traceable to the choice of wrong varieties and refined conditions such as polishing, washing and cooking involving considerable losses of nutritive elements. The one feature which distinguishes rice from wheat, and indeed from all other cereals, is that it is primarily consumed in the milled state. It is absolutely essential to do away with this very wasteful process. The League of Nations Inter-governmental Conference on Rural Hygiene has emphasised that *the problem of nutrition throughout the East is intimately connected with the degree of milling to which rice is subjected before being consumed.*

As with other cereals, the nutritive importance of rice lies primarily in its fuel value. It has a high *calorific value*, higher than that of wheat although, as observed by Wilson (1937), rice, when ready for consumption, is bulkier and contains more water than a quantity of wheat of equal calorific value; the higher water content of the former may be advantageous in a tropical climate, there being an increased reservoir of water for evaporation and urine secretion, thus regulating body temperature.

Rice, however, is imperfect in itself as a food and should form part of a good *mixed diet*. Not only should the necessary supplements be found and taken (c.f. Surie, 1936), but they should also be intelligently incorporated in the food. Present-day rice diets are highly monotonous, practically every course consisting of rice with but little variety or supplements. In addition to finding cheap components that will make the average rice diet a complete food, new methods of cooking them should also be introduced.

There is great need for research in the direction of evolving, by suitable selection and breeding work, nutritively superior varieties of rice and of preserving without deterioration, rice with its nutritionally rich bran layers. The public should also be educated in regard to the use of whole, unmilled rice, especially coloured or coarse varieties known to be rich in essential constituents. Increased use of such rice will greatly improve the present status of the rice diet and will result in better growth and greater improvement in the general health and well-being of a very large section of the population of India.

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A MEDICAL TOUR IN RUSSIA

By MAJOR-GENERAL SIR CUTHBERT SPRAWSON

Kl., C.I.E., M.D., F.R.C.P.

Late Director-General, Indian Medical Services

I

RUSSIA is a country that has certain analogies with India. Both are countries with populations mainly agricultural, but becoming somewhat industrialized and urbanized. This process is much more advanced and more rapid in Russia than in India. It has occurred to me after recently making a medical tour in European Russia that a brief account of the ways in which the Soviet is tackling some problems similar to those which India has to face might be of interest to readers of the *Indian Medical Gazette*.

There are of course many basic differences between the two countries as well as between their Governments. The first thing that strikes one on entering Russia is that it is a country of the young: no one about the streets seems to be over 35 years of age. One sees a few elderly women, but I saw hardly any old men except in hospital wards and in rural areas. When I asked for figures on this point, I was told that 46 per cent of the population were born since 1917 and that only 6 per cent were 60 years and over. The Soviet Union has now a population of 170 millions, increasing annually by 3 millions. One basic difference from India should be realized, that is that practically everybody, men and women, go out to work. The children from the age of two months to 18 years are for the most part lodged out for the day in a nursery or school, returning usually to the home in the evening. This arrangement appears to be completely carried out in towns, less so in the country.

One cannot see everything in a three-weeks' tour, however well that may be arranged, and the tour and travelling were both well organized; but I had told the Soviet authorities previously that my chief interests were in leprosy, tuberculosis and medical education and though I concentrated principally on those subjects I saw something of public health and of other activities as well. In leprosy I do not think they had anything to teach us, so I omit that subject now and will give a short account only of their medical education and of their campaign against tuberculosis.

Medical education

Russia is the only country other than India I know that still has a dual standard of medical education. There are the University graduates who after ten years at school undergo a five-years' medical course: and there are the *feldshers* who have only seven years at school followed by a three-years' medical training. Moreover the origin of the *feldsher* is similar to that of the sub-assistant surgeon and arose in military

requirements. Originally all European armies had field surgeons who were not graduates, in addition to some of the graduate class. It is now many years since the other nations abolished this class and had only graduates or diplomates of a high standard; but Russia, not being able to train enough graduates, retained the *feldsher* and he practised also in civil life. When the Soviet Government took charge they considered abolishing the *feldsher* class, but found it impossible for the present owing to the shortage of doctors; so the system continues and the total number of *feldshers* is now larger than ever before. Before the Great War the number of *feldshers* was larger than that of the graduates in the proportion of 3 to 2: and although the number of *feldshers* has increased the number of graduates has increased much more in proportion.

At the present time the number of medical students, graduates and *feldshers* is huge: there are about 96,000 undergraduates and about 45,000 *feldsher* students. Possibly when they have got their numbers up to their requirements the Government will again consider abolition of the *feldshers*.

Before the war there were in Russia between 20,000 and 25,000 graduate doctors. Doubtless several hundreds fell in the Great War, but after that war the casualties were much higher, both in the civil war and in the typhus epidemics, which were particularly fatal to doctors. As soon as the funds of the Soviet Government allowed, great efforts were made to replace the loss, and increasing numbers of medical students were taken annually. This explains the very large numbers given above. It should be understood that more than half of these students are women. In the Leningrad First Medical Institute, which I saw, about 75 per cent of the students were women. At this institute there were about 3,000 students, including a recent admission of 900 fresh students. As the First Medical Institute is only one of those in Leningrad, which city has a total of 10,000 University medical students, I was interested to see how they could deal with such enormous numbers. I suspected the medical schools and hospitals must be overcrowded and in my opinion they are overcrowded to an extent that must cause the instruction given and the standard of qualification to suffer. The First Institute had a hospital of 1,200 beds: the beds were closer together than we should allow. I was told that in addition the students had access to about another 1,000 beds in other parts of the city; but even these combined numbers must leave the clinical material insufficient. The laboratory work must be most difficult to arrange. The 900 students work in four batches, and both lectures and practical work are repeated to each batch. There is one microscope per student on each shift, so that the same microscope is in the care of four separate students at one time through

the term. In other countries the number of midwifery cases would be a difficulty, but in the Soviet every woman goes to hospital for childbirth and may be used for teaching purposes, so that each student manages to see ten cases of delivery before qualification.

From what I saw of both medical schools and hospitals they appear well equipped with necessary apparatus.

In the U. S. S. R. there are 72 institutes educating these undergraduates. This includes not only medical colleges such as the Leningrad Institute mentioned above, but also institutes of hygiene of which I saw an excellent specimen in Moscow. The system is peculiar in that it allows specialization in public health during the course so that a student can qualify in five years with his diploma in public health as well. Thus a student entering the Moscow Institute of Hygiene can select either general medicine, public health or pediatry as his line of study. For the first three years the course is the same for all. After that time if the student elects for general medicine or pediatrics he is probably transferred to the Second Moscow Medical Institute, though he may, if he prefers, stay on at the Hygiene Institute. They all receive qualifications entitling them to practise medicine, and even the hygienists receive instruction, though less than the others, in clinical medicine: but the last two years of the course has a bias towards the speciality the student has selected.

In the whole U. S. S. R. 25,000 new students entered in 1938. Of this number 4,000 selected pediatry and 3,200 public health, leaving the balance for general medicine. This early specialization is by way of an experiment and the Soviet authorities are watching the results: it has been going on since 1934.

Apart from the continuance of the *feldsher* class, whose education I did not study, it would seem that the graduate class must now be receiving an education that we should consider somewhat inferior. The Soviet authorities doubtless recognize this, but are concerned first to get their numbers up and to improve the quality later. If there were 25,000 doctors in 1914, there are 107,000 now, which allows one doctor for 1,588 of the population. The Soviet aim at having one doctor per 1,000 of population: hence the efforts at increase.

Now to compare the position with that of India which has a still greater population and still fewer recognized doctors. And yet doctors in India, even of good quality, often have a difficulty in making a living. There are basic differences in the conditions of employment in the two countries. In the Soviet all doctors are State employed: there is practically no private practice. At first the young graduates have to go where they are sent. Paradoxically the best students are sent to the most remote and less desirable places, because in such places and in primitive conditions they would have to rely more on themselves and

the students who get the highest marks are considered most capable of doing this. In the less desirable places they are paid more and may get such special privileges as a motor car or a cow and longer holidays. If married, his wife will also have to work and may be sent somewhere else. It was explained to me that after one or three years they could go where they liked and practise, a minimum of five hours' work a day being demanded: but I could not understand how it was possible to administer a State medical service if everyone went where he liked. There seems no desire to flock to the towns as in India: a public and pioneer spirit was said to lead the young men to rural districts. During undergraduate life each student receives a living wage and on qualification 300 roubles a month. It is impossible to translate that into our currency, because the exchange is artificial: for purchasing purposes I think one may regard one rupee as the equivalent of rather more than three roubles. The physician's wife might be getting a similar income, and he has not to bother about insurance, children's education or holidays: but he may not always have the same kind of family life as in India.

If, however, the present Soviet students are trained in our view imperfectly, this is to some extent compensated by excellent arrangements for post-graduate training. In the Soviet every doctor is supposed to have a post-graduate course of three to six months every three years. How this is arranged administratively I do not know: but I think the training is compulsory now, though it was not so last year. For post-graduate training there are special institutes, there being ten such places in the U. S. S. R.; but use is also made of the special hospitals for post-graduate training, for I saw post-graduates at work in the Tuberculosis Institute at Kharkov.

Such is a brief account of medical education under conditions that we may regard as a great experiment and one to be watched with interest. In India, I am sure we should be wrong to lower educational standards in any way in order to raise the numbers of graduates or licentiates; but I think we might do more to get many of our young doctors to work in country districts instead of spending their time in the overstocked towns.

II

Tuberculosis

A study of the anti-tuberculosis campaign in Russia is not only of interest but may give profitable lessons to our campaign in India. The Soviet results are remarkable, and if their figures are correct—I have no reason to doubt them, as where I could check them they tallied—then these results may cast doubt on what has been taught by some hygienists. It has been taught that the development of natural immunity in a population and improvement in its general social

welfare are the only important conditions that tend to a decrease in tuberculosis incidence and mortality. We are told that special anti-tuberculosis measures cannot take credit for the steady decline in mortality in Great Britain, for instance, from the year 1860, and the small rise that occurred in the war years is explained by the lowered nutrition of the people at that period. This last statement is doubtless true, but from a study of the Russian situation it would appear that not all the credit can be taken by improved housing, drainage and nutrition; but that some improvement at least is due to the special measures that attend an anti-tuberculosis campaign. For whereas the conditions of general hygiene and nutrition have improved in Russia since the Revolution they have not, I consider, improved so greatly as the tuberculosis mortality, nor did the improvement in these matters apparently start so soon as the fall in mortality did. The decrease of tuberculosis mortality in the Ukraine seems to have started from 1923, whereas the rehousing of the people did not get well under way until five years later when the first five-year plan started. About nutrition I cannot write with certainty; the food of the people is better now than before the Revolution, but in some intervening years one has heard of shortage of food and even of famine. Further, and this is perhaps the most important matter, the improvement in the tuberculosis outlook has taken place in circumstances when one might have expected an increase in the mortality. We have been used to point to the beginning of urbanization and industrialization in India as a cause of the probable, but unproven, increase in tuberculosis mortality there, and to the influx of a rural and in some cases primitive population to cities already overcrowded. But these things have also been going on in Russia and in much greater degree than in India. Before the war the population of Moscow was $1\frac{1}{2}$ millions: it is now $3\frac{1}{2}$ millions and many factories have been erected. In other cities, such as Leningrad, the increase of population is also large, though less proportionately than in Moscow. Billions of roubles have been spent on rehousing and the erection of apartment-houses still goes on; but there is still overcrowding, and the living conditions of very many are still unsatisfactory and unhygienic. One would have expected therefore the tuberculosis mortality in Russia to have increased since the Revolution, but the figures show the reverse. For some of the figures of former years I am indebted to Dr. Sigerist's book on *Socialised Medicine in the Soviet*: more recent figures I have obtained direct from the Soviet physicians. I cannot give figures for the whole country, but in 1913 the mortality from pulmonary tuberculosis in St. Petersburg (Leningrad) per 10,000 inhabitants was 28.6, in 1931 it was 16.3, and I was told that it is now 12.0. Similarly in Moscow in 1913 the rate was 22.6, in 1931 it was 11.6, and I was told it is now

between 10 and 12. For two large cities of the Ukraine the mortality per 10,000 from tuberculosis (I think this refers to pulmonary tuberculosis only) is thus recorded—

		1923	1927	1932	1937
Kharkov	..	17.0	14.0	13.3	12.0
Odessa	..	22.7	17.9	17.2	?

The mortality is still high compared to some other countries, but the decrease has been remarkably rapid. Further, the Soviet authorities have set themselves as part of the third five-year plan, which began on 1st January, 1938, to reduce the present tuberculosis mortality again by one half. It seems impossible to cause so sudden a fall in the death rate of a chronic disease. We are accustomed to see the mortality line on the graph fall in a gentle slope; but the progress hitherto has been so remarkable that we need not be surprised at a further considerable diminution of mortality.

Now to examine the main features of the campaign and the methods that are employed. The first thing that strikes one is the intensity of the attack on the disease, the large number of institutes, dispensaries, sanatoria, etc., and especially the large number of personnel engaged. According to Dr. Sigerist there are about 27,000 physicians employed in tuberculosis dispensaries and sanatoria: if they are all staffed on the scale of those I saw I can well believe it. I saw one tuberculosis dispensary in Moscow that had 25 physicians and there are 25 tuberculosis dispensaries in that city alone. All these 27,000 physicians have had special training: that is to say, one-quarter of the total number of Soviet physicians is engaged in purely anti-tuberculosis work. To staff a campaign in India on the same scale we should require over half a lakh of tuberculosis specialists. Apart from that number special tuberculosis training is given to all undergraduates, as it is in India, and at the institutes post-graduate courses of four months in length are given to 500 young doctors yearly. The institutions of various functions that are engaged in the campaign are:—

- Central Tuberculosis Institutes.
- Regional Tuberculosis Institutes.
- Sanatoria.
- Special Hospital Wards.
- Dispensaries.
- Night Sanatoria: Day Sanatoria.
- Labour Prophylactoria.
- Sanatoria Schools.

Some of these terms require explanation.

The functions of a *tuberculosis institute* are to direct the campaign in its area, conduct research, collect statistics, publish popular literature as well as scientific articles, advise and inspect the dispensaries in its region, give undergraduate and post-graduate instruction, and generally advise all units who consult it and with whose activities it is in constant touch. There is one central tuberculosis institute in Moscow that

acts as a general staff for the whole campaign, and Moscow also has a regional institute for its own district activities. There are eleven republics in the Soviet Union, exclusive of 17 small autonomous republics, and five of these major republics have their central institutes, while there are many regional institutes. They all have both laboratories and clinical departments. The central institute of the Ukraine, which I saw at Kharkov, had numerous laboratories and 250 beds, including several for children in a separate block. The cases were those of special interest or requiring some special treatment. There was no out-patient department, but numerous cases are sent for consultation, from dispensaries and factories, but all for some special reason.

Sanatoria are on the same lines as elsewhere and situated in attractive places remote from towns, such as on the shores of the Black Sea or in forests. I did not see one. There are not enough sanatoria beds yet, only about 40,000 at present. The number is to be increased largely in the present five-year plan.

Some, mostly open cases, are treated in *special wards* of a general hospital. The Soviet do not build many special tuberculosis hospitals, but prefer to send cases as much as possible to sanatoria. There is one tuberculosis hospital of 250 beds eight kilometres outside Kharkov.

As elsewhere the *dispensary* is the battle-front of the campaign, with this difference from common practice, that whereas in most other countries the dispensary is for diagnosis, prevention and propaganda only, in Russia the dispensary undertakes treatment as well. This is done also in India, and I have previously advocated it as the correct practice in India, whatever may be done in Europe. The dispensary I saw in Moscow had thirty beds, where patients may be kept for a few days for observation or after minor operations, such as pneumothorax, phrenic evulsion and even Jacobus' operations. That dispensary served a district of 300,000 inhabitants and had about 10,000 patients of whom it saw 500 daily. I believe there are about 800 such tuberculosis dispensaries in the Union altogether, and, in rural areas not populous enough to support one, a part of a general dispensary is adapted for tuberculosis work. Nevertheless, they said the number of dispensaries was still insufficient. As elsewhere the chief work is detecting early cases. The one I saw was evidently hard at work all day. Visiting nurses are attached to them.

Night sanatoria are rest-homes for tuberculous workers who are able to go to the factory, but are not yet fit enough for ordinary life. They are partly for early cases and for these form also a means of education, but mostly for ex-sanatorium cases as a means to leading them gradually back to normal life. They and the labour prophylactoria take the place that a Papworth or similar colony does elsewhere. An attempt was made to organize a Papworth in the Soviet

but was not successful: the patients would not stay.

As every factory in the Soviet works continuously night and day in three shifts, *day sanatoria* are similarly arranged for night workers. At a night sanatorium the patients arrive in the afternoon after work, have a bath, dinner and rest. They are then seen by the doctor and go to bed at ten. The system is said to work well and such temporary sanatoria are attached to dispensaries and sometimes to institutes. I saw also a day sanatorium for children suspected of possible early tuberculous infection. They were being sent home after a meal at 6 p.m. There are many such institutions in the cities.

The *labour prophylactorium* is another example of Papworth-like occupation, except that it is not a separate institution, but several large factories have a special workshop for cases of suitable type. Such cases are not put on the land, but in factories where they can be better supervised. If the patient is not equal to his former occupation, he is instructed in new work. Their working hours may be less and they have special dining rooms. The labour question looms large in Soviet consideration and much attention is paid to the working of these patients. Much of the tuberculosis research work published in the Soviet is concerned with the amount of work that can be got from these patients without doing them any harm.

I saw near Leningrad a *sanatorium school*, a boarding school where tuberculous children were instructed. Several of them were having pneumothorax treatment without interruption to their classes or their games.

There is a considerable amount of bone tuberculosis treated at many of the above institutions, and there are special sanatoria for children with bone tuberculosis. The physicians did not seem to take much interest in the question of its possible bovine origin, and I obtained only vague answers to my queries on this point in all the cities I visited. The most definite reply was that there was not much bovine tuberculosis in human beings, except for some cases of peritonitis in children. I was told also that primary abdominal tuberculosis in any form was uncommon, which is different from our experience in India.

Much use is made of B. C. G. vaccination. In some cities it is compulsory for all children who are likely to be exposed to infection, but it is not compulsory everywhere, though an effort is made to persuade the parents to consent and since the vaccine is given by the mouth there is usually no objection. Considerable benefit is claimed for this measure but it is still in the experimental stage.

Gold therapy is not much used and is regarded as still experimental. Otherwise treatment is on the usually accepted lines.

One interesting point is the publication of research work by Ukrainian physicians (Morosovski; Moutti; Ginsberg) to demonstrate

that tuberculosis workers are subject to real danger from infection from their patients. They have shown a comparatively large morbidity which, they say, cannot be explained by natural selection or by chance. This is contrary to what we have been taught hitherto. I call to mind some statistics of the nursing staff of a large chest hospital in London which demonstrated that the risk of these nurses was no greater than that of nurses elsewhere. Personally, I incline to think the Ukraine physicians are right. All those who have worked at tuberculosis must know so many cases of their colleagues and assistants who suffered infection as to seem beyond the usual proportion. At any rate the Soviet authorities are so convinced of this danger that they pay their tuberculosis physicians more highly than the others.

The Soviet Government evidently pay the greatest attention to the advice of health advisers and value them highly. I saw many other things of interest in the Soviet apart from tuberculosis

and apart from medicine at all. Perhaps the most remarkable fact I came upon was that prior to 1914 no less than 82 per cent of the syphilis in Russia was of extra-genital origin. It was only in minor part a venereal disease.

The Soviet physicians were everywhere most courteous in showing me their institutions and activities and I am satisfied I saw things as they usually and naturally were, while the guide-interpreters, who were ladies and sometimes doctors' wives, were most patient in translating my numerous questions and their replies.

On consideration, I conclude, although the vigorous anti-tuberculosis campaign with its educative propaganda and rehousing must certainly account for some of the striking decrease in tuberculosis mortality, that the most important factor to that end, although I have no direct evidence to that effect, must be better nutrition of the people. I cannot see how anything else can produce so marked an improvement with such rapidity.

Medical News

SUMMARY OF TUBERCULOSIS NEWS FOR THE MONTH OF NOVEMBER 1938

Post-Graduate Courses in Tuberculosis

(a) THE seventh post-graduate course in tuberculosis organized by the King George Thanksgiving (Anti-Tuberculosis) Fund was opened on the 14th November at the King Edward Medical College, Lahore. Fifteen doctors from Northern and Central India were selected from among 169 applicants for training. In opening the course, the Hon'ble Minister of Education, Punjab, referred to the collection of rupees four lacs from the Punjab in response to Her Excellency the Marchioness of Linlithgow's Appeal for the King-Emperor's Anti-Tuberculosis Fund. The opening address on 'the tuberculosis problem' was delivered by Colonel G. G. Jolly, C.I.E., V.H.S., I.M.S., Inspector-General of Civil Hospitals, Punjab.

(b) The King George Thanksgiving (Anti-Tuberculosis) Fund has decided to hold a medical post-graduate course in tuberculosis at the All-India Institute of Hygiene and Public Health, Calcutta, from 30th January to 25th February, 1939. Eminent tuberculosis specialists and medical superintendents of some of the tuberculosis sanatoria in India will deliver lectures on various aspects of the subject, in addition to practical demonstrations, etc.

Selected candidates will be paid by the fund single second-class return railway fares to and from Calcutta up to a maximum of Rs. 100 per head.

Her Excellency the Marchioness of Linlithgow's Appeal for the King-Emperor's Anti-Tuberculosis Fund
The 22nd list of subscriptions actually received up to 31st October, 1938, amounts to Rs. 1,66,313-14-11, which brings the grand total of collections to Rs. 61,91,251-15-6.

DRUG CONTROL IN INDIA. POOR QUALITY OF ERGOT PREPARATIONS. BIOLOGICAL LABORATORY'S INVESTIGATIONS. ALL-INDIA DRUG SURVEY

THE urgent need for proper drug standardization and for a comprehensive scheme of drug control has been painfully brought out by a recent investigation

undertaken by the Biochemical Standardization Laboratory, Calcutta, into the liquid preparations of ergot sold in the Indian market and in common use for medicinal purposes. This laboratory, which was established by the Government of India in Calcutta in 1937, as a first step towards tightening of control over the manufacture, importation and distribution in the Indian market of drugs inferior in quality and spurious in character, has since its inception been engaged in an all-India survey of the quality of drugs. Some of the findings recorded in this laboratory reveal a serious state of affairs regarding the quality of ergot preparations that are daily being used in India.

Chiefly used to stop post-partum hæmorrhage, an emergency condition where energetic treatment with fresh and potent ergot preparations is essential to save the life of a mother, the poor quality of liquid extract of ergot which the commonest preparation employed in hospitals and private obstetrical practice in India constitutes, therefore, a grave menace to maternal health, and is possibly also a contributory factor to maternal morbidity from a subinvolved and imperfectly contracted uterus.

Inferior drugs imported

Of 130 samples of ergot preparations of different types, e.g., liquid extract of ergot, ammoniated tincture of ergot, solid extract, and ergot powder, tested in the laboratory, 112 samples or 86.15 per cent were found much below strength, and in 58 or 44.61 per cent no active principles whatever could be detected.

Of the samples examined 103 were of indigenous manufacture and 27 of foreign make.

The causes underlying this state of affairs are not clearly understood. While the deterioration of the active principles of ergot in the hot and humid climate of India may be an important factor in bringing about the poor quality of ergot preparations, the opinion is expressed that it seems probable also that an inferior quality of both crude and finished preparations of ergot, unsaleable in their countries of origin due to stringent drug laws, is being purchased in India at a cheap price.

General low quality

That the results obtained from these investigations are representative of the general quality of ergot

preparations all over India will be evident from the fact that the samples subjected to analyses were obtained from practically all the provinces of British India through the surgeons-general, inspectors-general and other heads of medical public health departments. A few were obtained direct from the customs office, within a few days of their importation, while another group of preparations was picked up at random from the open market.

The standardization of the ergot preparations was carried out by pharmacologists and pharmaceutical chemists working in close co-operation. The 'colorimetric method' of assay described in *British Pharmacopœia* 1932, with the modification subsequently described in the Addendum to the *British Pharmacopœia* 1936, was generally employed and, wherever necessary, the results were checked by the 'rabbit-uterus' method of biological assay.

Results analysed

The following is a tabular statement of the analysis of the quality of ergot preparations on the Indian market:—

Analysis of the quality of ergot preparations on the Indian market

Nature of preparations tested	Total number	ORIGIN		PREPARATIONS BELOW STRENGTH			
		Indigenous	Foreign	Total number	Per cent	No active principle	
						Number	Per cent
1. Liquid extract of ergot ..	108	86	22	96	88.88	54	50.0
2. Liquor ergot fortis ..	8	8	..	5	62.5	..	..
3. Ergot prepared ..	8	5	3	6	75.0	..	..
4. Ammoniated tincture of ergot ..	2	2	..	2	100.0	2	100.0
5. Ergotinine citrate ..	2	1	1	2	100.0	2	100.0
6. Ergot powder ..	1	1	..	..	..	..	..
7. Solid extract of ergot ..	1	..	1	1	100.0	..	..
	130	103	27	112	86.15	58	44.61

especially during the war, and now there are at the Madras and Bombay Depôts two modern up-to-date factories, employing Indian labour capable of supplying all government institutions in India with drugs and preparations of *British Pharmacopœia* standard.

At each of these factories there is employed a highly qualified advisory chemist, whose duties include the analytical examination of every preparation made in the depôt factory and all supplies received from outside to see that they are up to the prescribed standard.

Purchases in India

Further, as soon as it is found that a preparation of the required standard can be obtained in India at a rate not more than the cost of manufacture in the depôts, the manufacture of that particular item is discontinued and it is purchased locally. More than half the amount provided for purchase of stores is in this way spent on purchases made in India. Stores worth Rs. 11,52,131 were imported in 1936-37, while stores worth Rs. 14,14,796 were purchased in India during the same period.

DRUG MANUFACTURE IN INDIA. MEDICAL STORES DEPARTMENT'S PIONEER WORK

It is not widely known that the Medical Stores Department has done pioneer work in the manufacture of drugs in India.

There are many preparations which are made exclusively by the department. For example, in Madras are made the four preparations of oleum hydnocarpus, used in the modern treatment of leprosy, and it is believed that this is the only source in India from which these preparations can be procured at a reasonable rate.

There are four Medical Store Depôts, located at Madras, Bombay, Calcutta, and Lahore, respectively, administered by the Director-General, Indian Medical Service, on behalf of the Government of India, Defence Department.

Up-to-date factories

The depôts were originally established to ensure the supply of drugs, instruments, and appliances, of uniform quality and pattern for the Army in India. In course of time their sphere of activity was extended and the civil medical institutions turned to them as the most reliable source of supply.

The stores were, at first, only distributing centres. It was, however, discovered that some of the drugs could be more economically manufactured in India than imported from abroad, and in consequence depôts undertook to do pioneer work in manufacturing. The number of items manufactured gradually increased,

A vital function

It is not the policy of the government to compete with private enterprise, nor is it the intention to make a profit from the Medical Stores Department, although it is desirable that it should be as nearly self-supporting as possible. Private institutions are not encouraged to obtain their supplies from the depôts, but the experience of the past has proved that the department was able to make good the deficiencies required for civil purposes and which were due to the failure or irregular supply of imported drugs.

The Medical Stores Department therefore fulfil a useful and necessary function, which may in time of crisis become vital.

PREVENTION AND CURE OF DISEASE. NEED OF CO-ORDINATING MEDICAL AND PUBLIC HEALTH DEPARTMENTS

THE activities of those responsible for medical relief and prevention of disease are so closely inter-related that it is impossible to draw any sharp distinction between them, and the consequent necessity for co-ordinating Government Medical and Public Health Departments is being increasingly felt.

Prevention better than cure

The Central Board of Health at its first meeting passed a special resolution which stressed the need for co-operation between these two departments, and recognizing the important position which prevention occupies in every phase of medical practice, both the

Medical Council of India and the General Medical Council of Great Britain recommend that 'throughout the whole period of study the attention of the student should be directed to the importance of the preventive aspects of medicine'.

In most countries all branches of medicine are administered by one Health Ministry with separate higher directing staffs, but India is peculiar in the extent to which in some areas the activities of medical and public health departments have been separated or in a few cases even divorced from each other.

The prevention of disease has come to be universally recognized as being the chief aim of medical work and most of the administrative medical officers are now enthusiastic advocates of disease prevention; indeed some of them have been specialists in public health for the greater part of their previous service. All of them state that they are prepared to co-operate with the directors of public health and to insist on a similar co-operation on the part of the members of their staff.

This combination of effort does not mean the swallowing up of one department by another but only that, whenever it is in the interests of efficiency and economy, the medical man ought to engage both in medical relief and public health work.

In the district

While a satisfactory degree of liaison exists between the directors of medical and public health departments, it is in the district, in the sphere of the civil surgeon and the district health officer, that health presents its most important problems and where there is the greatest need of co-operation. Separate higher directing staffs technically qualified, co-ordinated by an administrative head, are essential for efficiency, but when we come down to smaller district units, such as the village dispensary, it is certain that India can never afford to maintain two experts for each small centre of her population.

The dispensary doctor

As long as the ideal is unattainable for financial and other reasons, the most promising line to follow is that of the District Health Bureau recommended and outlined by the Central Health Board, on which the civil surgeon and the public health expert of equal standing can co-ordinate all their activities.

Further the dispensary doctor must be brought more intimately into the local health picture and his usefulness increased by improving the teaching of hygiene and public health in medical schools and colleges. In their knowledge of the people and the confidence in them, gained by frequent contact, the civil surgeon

and the dispensary doctor are valuable assets which should be fully utilized.

THE ROYAL MEDICO-PSYCHOLOGICAL ASSOCIATION

THE first general meeting of the Indian Division of the Royal Medico-Psychological Association will be held on 23rd and 24th January, 1939, at the Punjab Mental Hospital, Lahore, under the chairmanship of Lieutenant-Colonel C. Lodge-Patch, M.C., I.M.S., Medical Superintendent. The Governments of India and Ceylon as well as the provincial Governments of Assam, Bihar, Bombay, Central Provinces, North-West Frontier Province, Punjab and United Provinces have kindly agreed to grant members employed under them special leave and travelling expenses to attend our meetings triennially. The Government of Madras have sanctioned only the concession of special leave for one officer to be selected by the Surgeon-General. The Governments of Bengal, Orissa and Sind have no member working under them but are willing to consider the matter when necessary. Members who wish to avail themselves of the facilities granted by their respective Governments should apply to them at once through the proper channel for permission to attend the meeting. This notice is issued so early to give every member sufficient time for this purpose.

On 23rd January, 1939, at 8 p.m. the Association Dinner will be held. All attending members are specially requested to join the dinner. The dinner fee of Rs. 8 should be sent before 10th January, 1939, to Lieutenant-Colonel C. Lodge-Patch, M.C., I.M.S., Medical Superintendent, Punjab Mental Hospital, Lahore, so that he may be able to make the necessary catering arrangements.

It is hoped that many members will contribute interesting and instructive papers to be read at the meeting. Such papers should be of a practical rather than an academic character. The principal object of the meeting is to provide an opportunity for psychiatrists to pool experience and to exchange ideas in order to improve psychiatric work in this vast country. It is not possible to allot more than 20 minutes for the reading of any paper and 5 minutes will be given to each speaker in the subsequent discussion. Those willing to read papers are particularly requested kindly to forward to Dr. Banarsi Das, Mental Hospital, Agra, a precis of the same by 20th December, 1938, at the latest.

Dr. C. J. Thomas, an eminent member of the Association in England, is coming out to India and is expected to bring out for us some token of goodwill from London headquarters to be personally presented to the new Indian Division at its first meeting at Lahore.

Current Topics

Some Recent Advances in Medical Diagnosis and Treatment

By A. H. DOUTHWAITE, M.D., F.R.C.P.

(Abstracted from the *British Medical Journal*, Vol. I, 28th May, 1938, p. 1143)

MEDICINE has made such gigantic strides in the last few years that to cover the field would be a task beyond my powers. I shall limit myself to those recent advances with which I am chiefly familiar. Most of these relate to the digestive tract.

SIALOGRAPHY

The radiographic demonstration of the ducts of the parotid and submaxillary glands has been made possible by the injection into them of substances opaque to

x-rays. By the introduction of lipiodol into the parotid duct the outline of the main duct and its branches can be demonstrated and, when infection occurs, various abnormalities such as spherical dilatation, comparable to that seen in bronchiectasis of the lung, can be demonstrated. Symptoms and signs of recurrent pyogenic parotitis fully investigated by examination of the saliva and also by sialography have been summarized. It usually starts with a feeling of fullness in the region of one parotid and then slight swelling. Attacks may be initiated by a meal. The gland gradually enlarges, reaching its maximum within a few hours up to twenty-four, and subsides over a course of several weeks. During subsidence a foul taste may be experienced, and examination may reveal muco-pus oozing from the duct. After a period of relief the whole process is repeated. It is interesting to note that the ratio of females to males is 8 to 1. So far as

physical signs are concerned the gland is easily palpable, not uncommonly tender, and, with acute exacerbation of the disease, fever, increase of swelling, and well-marked tenderness are present. The saliva, instead of being clear, contains numerous flakes consisting of shreds of mucus with pus cells, epithelial cells, and micro-organisms. I have notes of seven patients whom I have seen with this disease, and five of them have apparently recovered completely as the result of massage to the parotid, directed especially along the line of the duct, and also diathermy. In one case of submaxillary gland infection its removal resulted in entire disappearance of symptoms. In the submaxillary gland case and three of my parotid patients the outstanding symptom was, in point of fact, that of *soreness of the tongue*, and owing to the great frequency with which one meets this most troublesome symptom in practice the possibility of a chronic infection of one or other of the salivary glands should certainly be borne in mind.

GASTRIC AND PEPTIC ULCER

One cannot obtain a clear idea of the advances made in the diagnosis and treatment of these conditions without briefly reviewing the last twenty years, or even more. It was Moynihan who was responsible for describing the symptoms of duodenal ulcer and placing that condition in the medical map as a diagnosable entity. In 1921 Bennett and Ryle published the result of their investigations of a hundred healthy students by means of a fractional test meal, and thus applied a further stimulus to gastro-enterology. They showed that 20 per cent possessed a degree of free acidity which fell outside the mean curve. Of this 20 per cent half were hyperchlorhydric and half were hypochlorhydric or achlorhydric. It was about this time that they and other workers popularized the alkali treatment of gastric and duodenal ulcer. MacLean and others wrote on the cure of gastric and duodenal ulcers by intensive alkaline treatment. They referred to the already well-known fact that suitable alkalis, rest, and diet would cause a disappearance of symptoms, and produced various radiographs showing the disappearance of ulcer craters. The investigations of these patients were not, however, repeated after a long enough interval to justify the assumption that they were cured.

We now know that a great number of methods of treatment will result in the apparent cure of an ulcer if judged purely by x-ray appearances. I have produced equally striking effects with histidine in patients who have had no other treatment, but am quite satisfied that, in spite of the relief of symptoms, the ulcers were not cured. This drug, which has been used largely in the form of a preparation called 'larostidiu', is injected intramuscularly daily from fifteen to twenty doses. Numerous and conflicting reports have appeared as to its value. The general opinion of critical observers is that it seems to have some effect in aiding the healing of ulcers, but it is not permanent, and certainly the preparation cannot replace the more orthodox methods of therapy. I began to doubt its efficacy when I followed up histidine-treated patients for a few weeks subsequent to the discontinuation of treatment. In every case a relapse was noticeable, not only from recurrence of symptoms but also from x-ray appearances within five weeks. No doubt the mere fact of relapse is a strong point in favour of the histidine having done some good, but, on the other hand, it is highly improbable that anything approaching healing could have been produced with such an early return of all the signs and symptoms. There is no evidence that ulceration in the human being is due to deficiency of histidine, and there seems, in point of fact, no convincing experimental work to justify its use. If a series of patients are treated with an intensive alkali and dietetic regime and compared with those treated with histidine it will be found that there is very little difference in the immediate recovery percentage. On the other hand, ~~in~~ histidine-treated patients relapse more readily ~~and~~ ^{or} ~~pior~~ ^{more} rapidly than those treated by diet ~~and~~ ^{and} ~~therapy~~ ^{therapy}. Gastroscopy has already taught us

that large craters as seen by x-ray seldom seem so deep when observed by direct vision. The apparent depth is produced not only by swelling of the mucosa but by contraction of the underlying muscularis.

ASSOCIATIONS OF GASTRO-INTESTINAL DISEASE

The remarkable discoveries of Minot and Murphy relative to the treatment of pernicious anæmia, and the more recent work of Castle in explaining the association of achylia with this hitherto fatal disease and with sub-acute combined degeneration of the cord, have given a tremendous forward impulse to the study of gastro-intestinal disease and its relation to more remote systems of the body. I drew attention to an interesting group of hitherto unexplained cases of polyneuritis, sometimes of extreme severity, all of which appeared to be associated with disease of the stomach leading to achlorhydria or achylia, and termed these gastro-genous polyneuritis. In view of Castle's recent work it may well be that they are actually examples of European beri-beri, for it has been shown that in conditions of gastritis and achylia the absorption of vitamin B₁₂ may be deficient, and that an adequate supply of this substance is capable of curing certain types of neuritis, especially alcoholic neuritis, even though the original aggravating factor is still operative.

through the original aggravating factor is still operative. One observer preached unheeded for many years the doctrine of chronic gastritis. He studied stomachs preserved by the injection of 10 per cent formalin solution through the abdominal wall into the peritoneal cavity and into the stomach, and, following that investigation, he advanced the study of gastric pathology by the recognition of chronic gastritis and also of the acute variety. Whether one has to assume that all cases of achylia are the result of chronic gastritis is to my mind quite another matter. This has been accepted as a teaching during the last few years on incomplete evidence, for although it is clear that chronic gastritis might well be expected to produce atrophy of the mucosa in time, it is by no means certain that all conditions in which gastric atrophy is present have been preceded by an inflammatory state—in short, by gastritis. One must be cautious before jumping to this conclusion, particularly when it is borne in mind that the incidence of achlorhydria and achylia rises steadily with age. It seems on the face of it unlikely that an inflammatory condition of the stomach would attack the populace with such regularity. On the other hand, if achylia is due to a gradual degeneration, such as occurs in other structures with advancing years, the findings would be understandable. The point is of importance because if Hurst's view is correct, that gastritis is the precursor of achylia, and gastritis always precedes the development of carcinoma of the stomach, except in ulcer cancer, it should be possible materially to reduce the incidence of stomach cancer. If, on the other hand, achylia is frequently not the result of inflammatory changes, the whole supposed association between achylia, gastritis, and carcinoma becomes at once subject to considerable doubt. Cases of cancer of the stomach where test meals taken at intervals have shown the presence of a carcinoma and a free acidity which has steadily diminished have been reported. This would suggest that the cancer was responsible for the fall of acid. The most that can be said at present is that, although on theoretical grounds it is probable that the gastritis-cancer sequence is true in a proportion of cases, it must not be regarded as an invariable association, even apart from those cases of cancer which do sometimes arise in chronic gastric ulcer.

NON-ULCERATIVE HÆMATEMESIS AND MELÆNA

In using the term 'non-ulcerative' I mean to imply that the cases about to be described are those in which profuse hæmorrhage has occurred and shown itself either as melæna or as hæmatemesis, or both, and in which there has been no preceding history of ulcer and where the most careful investigations have completely failed to reveal the presence of an ulcer after the hæmorrhage. Furthermore, the subsequent history of these patients

has been quite unlike that generally associated with peptic ulcer.

My attention was first drawn to the possibility of severe hæmorrhage occurring in the absence of a readily demonstrable disease in the stomach or duodenum by a patient under my care at Guy's Hospital who had been twice admitted on account of recurrent severe hæmatemesis. He gave no history of indigestion. Melæna persisted for two or three days only and then cleared up. Several x-ray examinations revealed no disease. A fractional test meal showed achlorhydria and a great excess of mucus in every specimen. The case was presumably one of gastritis. With rest in bed, a non-irritant diet, and gastric lavage he rapidly improved. A further test meal revealed a return of free hydrochloric acid and no excess of mucus. There has been no recurrence of symptoms after five years.

A man aged 50 was seen by me three years ago on account of severe hæmatemesis and melæna, again with no preceding history of indigestion. Physical examination was negative, except for hæmoglobin of 52 per cent and heavily infected teeth. He was treated with soft diet and rest in bed, but had a further severe melæna. His doctor then called in a surgeon, who performed a laparotomy and found no abnormality. The patient recovered in spite of this. A test meal revealed exactly the same state of affairs as in my previous case.

The next three patients were those with hyperchlorhydria. In one there was a history suggesting a duodenal ulcer, but this was not demonstrated by the most careful and repeated x-ray investigations, and the profuse melæna for which he came in cleared up in two days. The other two patients are of considerable interest, since both of them were doctors and reliable witnesses. The first consulted me because he had noticed black stools and had felt giddy. He said that he had been perfectly well until a few hours after being at a cocktail party, where he had had only one cocktail but had eaten a large number of salted almonds. His theory was that these had scratched his mucosa. Investigation in a nursing home revealed the hyperchlorhydria so common in doctors. X-ray examination four days after the melæna showed a normal stomach and duodenum. Occult blood had left the stools in three days. The patient has been back at his busy practice for over two years since, and has taken no precautions: he has smoked and has taken alcohol without any further trouble.

The last example was that of a doctor who, on account of supra-orbital neuritis, kept himself going in his practice by taking aspirin. This had been proceeding for ten days when one morning he awoke with pain and took two aspirin tablets without water or milk, as had been his custom hitherto. A quarter of an hour later he felt a slight epigastric pain; the same day, four or five hours later, he felt faint and had colic, and soon passed stools containing a little visible blood and a large amount of tarry material. The value of this instance is that he had his alimentary tract examined by x-rays and a fractional test meal and a blood count done four or five days before this occurred, and, apart from a hyperchlorhydria, he was shown to be normal. The investigations were purely precautionary, as he had reached middle life (41 years). After the melæna, which lasted for three days, his hæmoglobin was 58 per cent. In spite of this he carried on at work, and made a complete recovery. When radiographed twelve days after the bleeding, again no abnormality was found. He had never had any symptoms of indigestion, and has had none since, although two years have elapsed.

The last two cases, I believe, illustrate the susceptibility of the gastric or duodenal mucosa, especially in the presence of a high acid, to what are regarded as minor sources of irritation—in the one alcohol, or possibly salted almonds, in the other free acid liberated from aspirin.

Clearly, it is of practical value to realize that profuse hæmorrhage may occur as the result of chronic gastritis on the one hand, or comparatively slight trauma in the presence of hyperchlorhydria on the other hand, otherwise these patients might well be condemned to

irksome and superfluous restrictions. The more our knowledge of the stomach increases, the greater does the value of special methods of investigation increase. It is only by these that we can be certain of such diagnoses as gastritis and mucosal atrophy. Many people presenting test meals of a type suggesting gastritis have no symptoms whatsoever. In the past it has been assumed that gastritis was present if there was hypochlorhydria or achlorhydria, associated with an excess of mucus. On the other hand, the finding of hyperchlorhydria, which is seldom associated with an excess of demonstrable mucus, was not thought necessarily indicative of gastritis. Too much importance has been attached to what has been regarded as an excess of mucus in the past. The less the acid secreted, the more will the mucus appear to be, although there may be no true absolute increase. Conversely, in highly acid specimens, mucus, when present, is masked and is very difficult to detect. The most obvious appearances of gastritis, as seen through the gastroscope, are usually to be found in a hyperchlorhydric stomach in which test meals reveal no mucus. In short, a hypertrophic gastritis that is very liable to superficial erosions and bleeding will give a test meal of hyperchlorhydria more often than not. If in cases of achlorhydria or hypochlorhydria there is apparently a great excess of mucus, so much so that it is difficult to obtain specimens through the tube, and if in addition blood or pus cells are detected microscopically in the test meal deposits, and again if the test meal has an unpleasant smell, it is probably correct to assume that chronic gastritis is indeed present.

The value of the *gastroscope* lies mainly in three directions: (1) Giving a clear view of the gastric mucosa, from which one can say with some degree of certainty that gastritis is or is not present. (2) Indicating whether an ulcer which has apparently healed, according to occult blood tests and x-ray examination, has in fact healed or not, and it requires many more weeks of treatment after the signs are absent before sound healing has occurred. (3) To determine whether an ulcer is malignant. A malignant ulcer can occasionally be recognized as such, when x-rays have failed, by observation of its irregular edge.

X-rays.—The combination of the use of small quantities of barium emulsion smeared over the stomach and duodenum and the development of apparatus which allows of aimed exposures, if necessary with compression, make such an advance in radiographic technique that, given enough experience in interpretation, there is seldom any possibility of error in the diagnosis of peptic ulcer, or genuine as opposed to imaginary disease of the appendix. The only common mistake is to diagnose gastritis too readily, but this aspect will gradually be checked by the extended use of the *gastroscope*.

A most important contribution to gastro-enterology has been made in recent years. Immediately after death from *pernicious anaemia* the stomachs were fixed by the introduction of formalin through a stomach tube. Microscopy showed that the characteristic lesion was one of atrophy of all the stomach coats in the region of the fundus and the body mucosa. The pyloro-duodenal region, which was hitherto supposed to be responsible for the production of the intrinsic factors necessary for the health of blood and spinal cord, was quite normal. Furthermore, *there was nothing to suggest that inflammation—that is, gastritis—had preceded the atrophy*. Gastrosopy confirms the localization of the trouble.

Fifteen years ago, when the orthodox treatment for gastric and duodenal ulcer was prolonged rest in bed and two-hourly feeds of milk and milky foods until the stools became free of occult blood, I abandoned this procedure in favour of a liberal though soft-diet, allowing milk, cereals, bread-and-butter, honey, fish, and egg, and purée of fruit and vegetable, after one week of rest in bed on milk only. I have had no reason to regret it. I had not the strength of my convictions when dealing with cases of hæmatemesis until reading of the most impressive series produced by Meulengracht,

who gave patients exhibiting hæmatemesis and melæna a liberal diet, including even meat, provided the food was soft and the solid food was served as purée, with the most excellent results. He points out quite rightly that it is desirable that the stomach should not be empty of food and thus contain free gastric juice, which may be highly acid and therefore detrimental to the ulcer which is bleeding. Furthermore, the prolonged starvation of the patient, and even deprivation of an adequate amount of fluid, which was so common in the past could only give rise to anxiety, restlessness, and diminishing recuperative powers. His method of feeding has now become fairly general in our hospitals, and the claims have been fully vindicated.

REGIONAL ILEITIS

Localized inflammation of the small intestine has recently been holding the centre of medical attention. Some observers reported thirteen cases in which it was in the terminal foot of the ileum. It appeared to begin in the ileo-cæcal valve, and produced ulceration and destruction of the mucosa with thickening and inflammation of the other coats and considerable narrowing of the lumen. Abscesses and fistulae were reported. Since that time it has become clear that the condition may occur not only in the ileo-cæcal region but also at other points in the course of the ileum. Microscopically the lesion is seen to consist of a benign nodule, often presenting giant-cell systems, and thus giving rise to the mistaken assumption that the condition was one of tuberculosis. This has been disproved not only by microscopical examinations but also by guinea-pig tests. The symptomatology is a varied one, but with adequate care it is probable that many cases can be diagnosed before operation. The picture may be like that of ulcerative colitis, with diarrhoea, pain, and fever; or again, perhaps more frequently, there is central abdominal pain and recurrent distension of the abdomen, gradually giving rise to a permanent picture of chronic intestinal obstruction. By this time a mass can often be palpated in the right iliac fossa or elsewhere in the abdomen. Loss of weight and anaemia are also fairly constant features. A sudden attack of pain, with tenderness and some rigidity in the right iliac fossa, has often led to the removal of a completely harmless appendix. This should be taken as a warning against the employment of minute incisions for the removing of an appendix, when a larger one would have brought into view the diseased area of the bowel. If found in the early stages the treatment is satisfactory, and consists of resection of the affected portion. X-rays will help in the later stages by showing a filling defect and partial obstruction of the ileum.

INTRATHORACIC DISEASE

The biggest advance in the diagnosis of pulmonary disease is due to the more general appreciation of the value of the bronchoscope. The discovery of a small carcinoma of a bronchus is thus made possible; it may explain the presence of a lung abscess, the persistence of a cough, or even the sudden development of auricular fibrillation or flutter in a hitherto healthy patient. Why this remarkable association exists is still a matter of doubt. Now that surgery no longer shudders at the removal of a lung such early diagnosis is of very real importance.

Tomography allows of the taking of x-ray pictures of the lungs in different planes, while the other planes are sufficiently suppressed as not to interfere with a clear visual examination of the area inspected. This is particularly helpful in relation to cavities, whether tuberculous or those arising from non-tuberculous abscesses.

O'Shaughnessy's cardio-omentopexy for angina pectoris and persistent disability from cardiac infarction is the outstanding achievement of present-day surgery. The balanced judgment of physician and surgeon in choosing suitable cases of coronary disease is an essential to success.

PHARMACOLOGICAL ADVANCES

Of *prontosil* and its derivatives so much has been written lately that it would be pointless for me to do more than pay homage to this remarkable drug. The hæmolytic streptococcus, the *Bacillus coli*, the gonococcus, and probably the meningococcus are all susceptible to its influence, the first, however, far and away the most constantly so. Likewise of *gold* in the treatment of rheumatoid arthritis I shall say little, except to emphasize the fact that it is of much greater value in treatment than any preparation used hitherto; but it also carries with it many dangers.

Eumydrine (atropine methylnitrate), the dose of which is a sixtieth to a thirtieth of a grain, is a valuable anti-spasmodic, and less poisonous than atropine sulphate. It appears to have revolutionized the treatment of congenital pyloric stenosis in infants and converted it into a medical rather than a surgical problem, to the benefit of the infants.

A valuable addition to our pharmacological resources is *zinc-prolamin-insulin*. The object of this preparation is to produce an insulin which is absorbed slowly and will therefore have its action spread out more evenly throughout the day, and thus approximate as closely as possible to the normal production of insulin by the pancreas. The action starts in about nine hours and reaches its maximum in fifteen to twenty hours after injection. A single administration of ordinary insulin and the zinc preparation in the morning may thus suffice for daily treatment.

The success of *measles convalescent serum* was so great that in an epidemic it was often impossible to obtain supplies. This difficulty has been overcome in the most surprising way by the finding of an effective anti-measles *placental extract*. A dose of 5 c.cm. at the first sign of pyrexia, headache, or Koplik's spots will either prevent the rash entirely or render the disease of trivial severity. Smaller doses given earlier in the incubation period will have a similar effect. When we think of the frequency and severity of complications and sequelæ of measles it is clear that this discovery is of the greatest benefit to mankind.

Endocrines.—The development of endocrinology has already led to therapeutic results that are little short of startling. One can safely predict the profound effect it will have on medicine of the future, for we are no longer employing foreign substances to influence body activities but rather the very essences of the mysterious life forces. Already we can alleviate the mental and physical disturbances of the menopause with oestrin; we read of virility given to eunuchs with testosterone; and before long I hope we shall have means to control the obesity of pituitary or hypothalamic dysfunction. Yet we must progress cautiously and sift the evidence of efficacy with care lest endocrinology fall into the disrepute so justly meted out to wholesale vaccine therapy and other vogues. Nowhere is this more important than in dealing with male impotence acquired after a period of normal function. So often the cause lies in the mind, and its cure is suggestion. The work on the efficacy of hormones in relation to absorption rate has been summarized revealing the remarkable fact that the more complete purification of the essential extract results in reduced effectiveness on administration. This is due to the hormone being too rapidly absorbed. To counteract this tendency such combinations as testosterone propionate or oestradiol benzoate have been devised.

The Treatment of Retention of Urine

By A. WILFRID ADAMS, M.S., F.R.C.S.

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It is easy to picture the derangement in a sufferer from acute retention. But, to diagnose which of the numerous underlying causes is responsible for his urgent state, to determine the best plan of treatment and predict his probable future often calls for sharp wits.

RENAL RETENTION

At the outset it is interesting to widen our terms of reference and, interpreting the title literally, consider briefly unilateral acute retention in one of the renal tributaries of the bladder. Here, as elsewhere, the impasse may arise suddenly in the previously healthy or acute may supervene on chronic obstruction. In either case, too, it may pass or persist. The resulting clinical picture is renal colic, a disturbance so intense and shocking because in it a richly innervating gland is suddenly distended. The patient writhes in agony when blood-clot, stone or necrotic fragments choke the ureter or when its lumen is closed by twists, kinks or supervening swelling in acute infection. The solution of the problem demands more than a few attendances and injections of morphia and atropine. It is our duty, even if the usual relief follows, to have a full urological investigation to elucidate the underlying cause or, when sedatives fail, to summon a surgeon versed in the subject. He may save further damage by threading a catheter past the obstruction and restoring renal outflow, drain or remove a progressive pyonephrosis in its inception or find signs of sinister import such as tuberculosis or malignant disease. Renal colic is a savage warning and to ignore it may be to miss a golden opportunity of taking a terrible disease in time.

THE SIGNS OF ACUTE RETENTION

Acute retention in the bladder, though less shocking than in the renal pelvis, is more serious because it dams not one-half but the whole urinary excretion. It threatens the life of the patient and not that of one kidney only. The patient has a typical pain, unless the retention is due to paralysis. The tender, ovoid, but not always symmetrical suprapubic swelling can usually be defined and found dull on percussion. In some cases its contour is obscured by overlying fat or muscle guarding, or, rarely, appears duplicated owing to a large diverticulum. Confirmation comes with outflow of the urine and disappearance of the swelling, if a catheter is passable. When the bladder is found empty the diagnosis is changed to 'anuria'.

The catheter test

In the usual case an attempt at careful catheterization will greatly help in diagnosis as well as being, when successful, a boon to the patient. Whether the obstruction is in front of or behind the triangular ligament can be gauged by this means, and useful information is gleaned from an examination of the urine, if obtainable. Obviously it does not apply in such cases as phimosis, acute gonorrhoea, vulvo-vaginitis and reflex retention, which may be rectified by other means.

Finally, with the help of general clinical examination, including that of the nervous system, a doctor is enabled to determine the cause with sufficient accuracy in the majority of cases. Cystoscopy and skiagraphy are useful refinements in some instances and essential steps in the diagnosis of not a few.

Ætiology and treatment

The causal conditions group themselves under two main headings, local and nervous.

Local. In the male

(a) In infancy occur congenital phimosis, paraphimosis, valve formation in the prostatic urethra and impacted calculus. The remedies are obvious, and when medication, a hot bath or catheter fail, appropriate operation will succeed. The boy with mucosal valves in the prostatic urethra has already bilateral hydronephrosis from chronic retention. Treatment is for the specialist, and prognosis guarded.

(b) In the second decade additional factors may develop, foreign bodies may have been inserted or gonorrhoeal infection contracted and caused swelling or abscess of the prostate. This yields to hot baths or sedatives, but occasionally a gentle catheter is required

(c) It is in the adult male that the disease is chiefly found.

1. Hematuria may occur from injury to the kidney or from renal, vesical or prostatic tumour or following prostatectomy by the open or endoscopic operation. Such hæmorrhage often abates by an irrigation and in-dwelling catheter which later allows deliberate attack on the cause. It occasionally fills and clots in the bladder. This defies the expulsive efforts of the patient and adds to his afflictions that of acute retention. Urgent evacuation of the massive clot is compulsory, as are continuous irrigation of the bladder, drainage or, even, prompt removal of the offending prostate or kidney when hæmorrhage is otherwise uncontrollable.

2. Impaction of a stone is the common cause of sudden interruption of normal outflow. There may be a preceding history of renal colic or transient dysuria and it is usually readily diagnosed. When, however, the stone is in the posterior urethra or meatus it is readily dislodged into the bladder by a catheter with effectual relief and without the doctor detecting its causal presence. The patient is delighted enough, but the doctor mystified, unless he discreetly resorts to radiography and cystoscopy. Without extraction or litholapaxy the trouble will recur, and the patient's confidence be shaken.

A stone lodged in the anterior urethra is palpable. If it cannot be coaxed out or back into the bladder, it demands external urethrotomy. It is wise to exclude likely calculous companions in the upper urinary regions by skiagraphy.

Since sudden checking of a free flow and retention are associated with two other conditions, it is well to refer to them here. When a papilloma arises from the trigone, its fronds may be carried by the outflowing current of urine into the urethra, suddenly stopping the stream. A loose blood clot may do the same. Cystoscopy is required for their diagnosis and treatment.

3. Stricture of the urethra follows trauma or venereal disease. The latter is less likely in these days with the provision of free efficient clinics, but still goes on to acute retention at times and occasionally surprises the doctor in the elderly male. It is well, if gentle efforts, hot baths and sedatives fail, to arrange for an anæsthetic (spinal is appropriate) and to be prepared for the worst. We may find a case of stricture or multiple stricture permeable to a filiform bougie but no more. It is best to be content and tie it in for the patient to pass water alongside it for a few days. Thereafter routine progressive dilatation will be possible. If the stricture defies even a filiform bougie, supra-pubic puncture with a slender trochar and cannula gives temporary relief. The cannula, or a small catheter threaded through it into the bladder drains it for a few days, and with the relief of tension and oedema in the urethra, penile instrumentation may then succeed. The alternative is external urethrotomy (Wheelhouse) which allows a catheter to enter the bladder after cutting through the stricture. Cystitis, rigors and even fatal ascending pyelonephritis may ensue. Epithelioma occurring independently or supervening at a stricture may occlude the urethra.

Extravasation of urine

Here, mention of the deadly menace of urinary extravasation needs emphasis. It is one of the most fatal dangers in acute retention from stricture. Even when clean urine escapes from wounds of the bladder a serious cellulitis or peritonitis will ensue, but the process is apt to be somewhat insidious and take a day or two in declaring itself. If, owing to the unrelieved acute retention, heavily infected urine finally bursts through the dilated and ulcerated urethra proximal to a stricture, intense pain and virulent cellulitis result. The trouble spreads rapidly and may quickly overwhelm the patient. Prompt supra-pubic drainage does best by diverting the stream and is combined with incisions to drain the sodden tissues around the public region, the stricture being cured later.

Post-prostatectomy stricture appears at varying intervals after what has often appeared a perfectly successful operation, and sometimes causes acute retention. Diagnosis is almost automatic but permanent cure sometimes necessitates reopening the operation wound, if the scar at the bladder neck resists instrumentation. Such a calamity is less likely if precautionary sounds are passed before the patient leaves the surgeon. The doctor should observe the stream at monthly intervals for a time, and warn the patient to report any suspected diminution in outflow.

4. In the males over fifty and occasionally before, prostatic tumour is the common cause of acute retention. It is not till the soft catheter reaches the bladder neck that resistance is felt but, usually, a little pause and gentle pressure overcome it. The prudent doctor will let the expert take charge in stubborn cases rather than risk complicating the case by hæmorrhage and sepsis from unskilful efforts with stiff catheters. The cancerous gland is apt to be harder to feel and to penetrate. A tale of prostatic dysuria and the clinical findings are confirmatory. Although no swelling of the gland is felt per rectum, it may still be causing obstruction by fibrotic contracture at the bladder neck.

Before embarking on first-aid the doctor must decide whether the case is one of sudden distension of the bladder, or of acute supervening on chronic retention. With the latter is met the giant bladder and the pain is apt to be paradoxically less the greater the distension. The long history of ineffectual frequent micturition and the symptoms of renal deficiency confirm the dread suspicion. Incautious catheterization easily empties the bladder but the patient may die in a few days of renal suppression from too sudden release of chronic tension. When a doctor rings me up and triumphantly relates that he withdrew 4 to 5 pints, I shudder, and spend ensuing days in anxiety. Better for the patient is it that he be sent unrelieved to an institution and deliberate gradual depletion then started. Various continuous drip drains or intermittent withdrawal of about three ounces hourly from a spigoted catheter may be adopted, and the bladder level marked daily on the abdominal skin as a further guide. If the bladder is only recently distended, then a more rapid depletion or complete evacuation is appropriate. In occasional cases, natural micturition returns after repeated catheterizations, and evidently a few days of such aid allow resolution where recent swelling of the prostate is merely congestive. Urinary antiseptics, bland drinks and even intravenous glucose and saline drip infusions where renal function is shaky, are used pending recovery and further radical measures. If catheterization fails or is intolerable, the surgeon resorts to supra-pubic drainage after deliberate exposure of the bladder wall to avoid accidental violation of the peritoneum, and gradual depletion is used where that precaution is necessary. Local anæsthesia or nitrous oxide gas are advisable. Where heavy hæmaturia complicates the prostatic case and clotting clogs the catheter, a large supra-pubic drain (No. 34 Malecot) is the least that will allow evacuation, and I have had to resort to immediate (and successful) prostatectomy. Cardio-respiratory complications share with renal risks the main responsibility for the considerable mortality this type of acute retention carries with it.

5. Instrumental interference in the bladder, especially with large cystoscopes in nervous folk or men with prostatic tendency, sometimes induces acute retention, which may call for temporary catheter relief, or, if there is pus about, supra-pubic drainage may alone be adequate. The cause is apt to be a mixture of local and nervous factors in this class.

6. Inflammatory conditions, septic, venereal or tuberculous in the prostate and vesiculæ have already been mentioned and abscesses in the perineum may prevent egress of urine. Their incidence in earlier decades, shorter history and tendency to pyrexia will, in such cases, put into the doctor's mind some alter-

native to prostatic neoplasm, although the mimicry may be very deceptive.

Local. In the female

Among women the opposite, incontinence, is a common complaint, whereas retention, owing to its rarity, makes unusual demands on diagnostic ability.

Acute vulvo-vaginitis causes reflex inhibition of micturition occasionally in infants, while, if hysteria is responsible in older girls, the usual stigmata will present themselves and organic causes will be lacking. Very rarely congenital atresia, or less rarely, inflammation cause stricture and chronic distension of the bladder. Expulsion of urine may be almost or completely impeded. Anæsthesia is sometimes necessary before the urethra can be penetrated, while the malformation may only be curable through a supra-pubic cystotomy. The retroverted gravid uterus, calculus or, in later years, impacted fibroid or urethral cancer are causes that careful examination defines and the cure of which calls for no mention here.

NERVOUS CAUSES

There remains a large group of patients already ailing from nervous maladies who are prone to acute retention as a complication of nervous dysfunction. Hysteria has already been discussed.

(a) Post-operative retention. The numerous ruses of the nurse and drugs invoked to overcome this bear witness to its frequency and duration. A halting mechanism may respond to one or two injections of 1 c.c. of 'Doryl'. If local heat, a glycerine enema, or cautiously sitting the patient on the edge or out of bed where permissible fail, careful catheterization cannot usually be deferred longer than 20 hours. This form of retention derives further importance because it is apt to be insidious and masked by the pain which the doctor expects to meet from flatulent swelling of the bowels. This confusion of urinary and alimentary disorder sometimes puts the patient's life in jeopardy.

Reflex retention is prone to occur after operations about the groin and perineum. It is one of the chief and most serious risks in removal of the rectum owing to derangement of the pelvic plexuses. In the male, I tie in a No. 8 rubber catheter which is changed every third day, and the urethra is irrigated. Recovery ensues after a week or two. I know of few greater demands on a nurse's dexterity and devotion than avoiding contamination of the bladder during repeated catheterizations in the female. In these cases the tendency to infection is mitigated by an acidifying medicine with hexamine and natural function usually soon recovers.

(b) The retention associated with head and spinal injuries requires catheters until consciousness returns, but when the cord is crushed in fracture dislocation of the spine, the outlook is grave unless, after a few weeks, automatic action develops under the control of the pelvic plexuses.

(c) In patients suffering from chronic disorders of the nervous system the causal disease has often already declared itself by other symptoms, or diagnostic signs are detectable.

Tabetics are liable to this trouble, as are folk with sclerosis, myelitis and compression paraplegia. In these, the doctor is apt to be more concerned by finding gross distension of the bladder than is the patient to complain thereof. A catheter is unimpeded and instrumentation well borne, but the trouble recurs. Where by reason of an obvious prostatic enlargement in a patient with dubious nervous disorder, it is reasonable to hope that the retention is curable by prostatectomy, this operation may be sound treatment. This would only be done after precautionary examination of his C. S. F. by a pathologist, a physician's and neurologist's blessing. The alternative, unless automatic evacuation develops and keeps retention in abeyance, would be permanent supra-pubic drainage.

The Causation and Treatment of Conjunctivitis

By R. A. GREEVES, M.D., F.R.C.S.

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THE conjunctiva is one of the most delicate of the mucous membranes of the body in so far as sensitivity, response to irritation, and liability to infection are concerned. When any mucous membrane is irritated or inflamed an increased formation of mucus occurs in response, and the conjunctiva is no exception to this rule; on the contrary, the association of gummy discharge with conjunctival inflammation is so constant as to be a reliable and therefore valuable factor in differential diagnosis. The mucus-producing cells of the conjunctiva are known as goblet cells, but they differ from those of the intestine in that they are completely cast off with their contents into the conjunctival sac. Any one of the cells of the stratified epithelium of the conjunctiva can apparently become transformed into a goblet cell—indeed, microscopical sections of inflamed conjunctiva show that a large proportion of them have done so. The number of cells thus transformed varies directly with the severity of the inflammation; clinically the amount of the sticky discharge varies in the same manner.

In addition to the mucus, which is normally an important factor in the lubrication of the lids and globe, lachrymal secretion is poured into the conjunctival sac. An increase in this secretion also takes place under the influence of irritation and inflammation, hence watering of the eyes is a symptom of conjunctivitis. But while increased lachrymal secretion occurs in association with many other forms of ocular irritation, e.g., corneal ulcers or iritis, an excess of mucus is poured out as a response to conjunctival irritation only, hence its special value in diagnosis. In questioning a patient as to symptoms, it is best not to use the term 'discharge only' which is equally applicable to lachrymal and mucus secretion, but to qualify it with the terms 'watery' and 'sticky'. In mild cases of conjunctivitis when mucus discharge is scanty none of this discharge may be visible at the time of examination—or possibly only a small quantity in the neighbourhood of the caruncle. But it is always apt to collect during sleep, hence the patient suffering from even the mildest conjunctivitis will usually admit to the presence of some sticky secretion, either on the edges of the lids or in the corners of the eyes when waking in the morning. In more severe cases of course, the eyelids may be so glued together that the patient cannot open them until he has removed the semi-dried glutinous matter.

The conjunctiva, like other mucous membranes, consists of a surface epithelium and a supporting tissue. The structure of this epithelium varies in different parts—on the eyelids it is two-layered, but in the fornices and on the globe definitely stratified. This structural difference may have some bearing on the fact that certain parts of the conjunctiva are more affected than others by different kinds of infection. To give two examples—trachoma first attacks the retrolarsal fold of the upper lid, and in chronic staphylococcal infections the bulbar conjunctiva is not involved.

The subepithelial supporting tissue is extremely loose in the fornices and on the globe, and for this reason is capable of great distention by oedema (chemosis) in response to acute inflammation of the conjunctiva or of the eyelids. A familiar example of this is the ballooning of the conjunctiva which occurs in association with a virulent 'stye' on the eyelid.

In concerning conjunctivitis in general it must be remembered that the cornea may be affected by the same agents which give rise to the conjunctival disturbance.

TREATMENT OF INFECTIVE CONJUNCTIVITIS

As I have already pointed out, the conjunctiva is a particularly delicate mucous membrane. It will

therefore not tolerate any but relatively weak solutions of substances which are at all irritating, and as no one has yet succeeded in discovering antiseptics devoid of irritating properties, these can be applied to the conjunctiva only in dilute form. Indeed, the results of experiments on the effect of antiseptic drugs in strengths commonly used as eye lotions, on cultures of micro-organisms *in vitro*, have led laboratory workers to deny that drugs so dilute have any bactericidal effect and to maintain that washing out the conjunctival sac with a non-irritant such as normal saline would be equally, if not more, beneficial. But clinically this view is not borne out by results; on the contrary, the curative effect of appropriate antiseptic solutions is most striking.

In the treatment of the two commoner groups, catarrhal and mucopurulent conjunctivitis, a mercurial solution, such as hydrarg. perchloride 1 : 10,000, mercurochrome 1 per cent or hydrarg. oxycyanide 1 : 8,000 can be used. The hydrarg. oxycyanide is much less irritating than the perchloride and has not that great disadvantage which the use of mercurochrome entails, namely, the staining of the skin of the eyelids a bright red colour. The conjunctival sac should be washed out two, three, or four times a day with the solution according to the severity or chronicity of the case. The washing out must be thorough, but not too long continued, about half a minute at a time, and the most effective method is by means of an 'undine' but as this vessel must be manipulated by a second person and the method is a 'messy' one, it is not always possible for the patient to adopt it. The next best thing is an eye-bath of the usual pattern. In cases of catarrhal conjunctivitis of an 'angular' type (Morax-Axenfeld) zinc sulphate must be added to the solution— $\frac{1}{2}$ grain to the ounce is sufficiently strong. Even in this dilution the zinc sulphate has considerable irritant and astringent properties, but owing to the fact that the itching peculiar to this type of conjunctivitis is allayed by these particular properties, the solution is usually well tolerated. This (angular) is the only type of conjunctivitis in which the use of a zinc salt is beneficial—in the other types it merely irritates without doing any good. My reason for using the hydrarg. oxycyanide in solution in addition to the zinc sulphate is that a *Staphylococcus aureus* infection is usually present concurrently with that of the Morax-Axenfeld diplobacillus.

To relieve and prevent the matutinal stickiness of the eyelids an ointment of some kind should be inserted between them at night. Simple yellow vaseline or boracic ointment is effective, but in the 'angular' cases, and in chronic staphylococcal cases, especially when the glands and hair follicles of the lower lid have become infected, I prefer the following:—

R. Ichthyol	..	..	0.15 parts
Zinc oxide	..	..	2 "
Vaseline (yellow)	..	..	15 "

This should be rubbed on the lid margins besides being introduced between them. Any mercurial solution is an irritant, consequently the patient may not feel that his eyes are quite normal until two or three days have elapsed after its use has been discontinued. In the early stages of an attack of mucopurulent conjunctivitis an application of 1 per cent silver nitrate to the palpebral conjunctiva is of value, and indeed in my opinion considerably hastens the cure. A wool-mounted probe or glass rod is dipped into the solution and lightly brushed over the conjunctival surface of the everted lids. In severe cases this may with benefit be repeated daily for two or three days, but a single application is usually enough. The eye may previously be anesthetized with drops of 2 per cent cocaine hydrochloride. Also in cases of chronic conjunctivitis when the palpebral conjunctiva of the upper lids has become granular and rough, silver nitrate solution (1 or 2 per cent) should be applied to the everted lids in this way, at intervals of two or three days, until the conjunctiva has resumed its normal smooth appearance. A case of chronic conjunctivitis is occasionally seen conforming mainly to the catarrhal type, but resulting

from an initial, insufficiently treated mucopurulent attack, and really pneumococcal in origin. In this type of case 1 per cent optochin in the form of drops two or three times daily may be of great benefit; this treatment is, however, rather painful and for this reason can rarely be prolonged for more than a few days. I have found optochin useful in clearing up the residual conjunctivitis after an operation for removal of an infected lachrymal sac.

No mention has yet been made of the various preparations of silver for the treatment of conjunctivitis which are on the market. I have found them to be of singularly little benefit in the treatment of chronic catarrhal conjunctivitis. Argyrol or protargol drops may, however, be used in addition to the mercurial solution in the treatment of mucopurulent cases; one or other of these preparations may be dropped into the conjunctival sac after it has been washed out with the mercurial solution, and repeated at more frequent intervals. Argyrol is singularly unirritating and can therefore be used in strong solutions, but a 1 per cent solution of protargol, which is definitely an irritant, is sufficiently strong for frequent use. Incidentally the longer a solution of protargol is kept, especially if exposed to the light, the more irritating it becomes, and stale protargol, which has been kept for a long time among a chemist's stock of drugs, may be excessively so. Protargol, on the other hand, is probably more effective than argyrol; indeed it has been shown to possess definite bactericidal properties *in vitro*.

A preparation, of the use of which I entirely disapprove in the treatment of infective conjunctivitis, is the well-known ung. hydrarg. oxidi flav. (golden ointment). It is a strong irritant, and its mercury content is too insoluble to act as an antiseptic. For the endogenous varieties of conjunctivitis, however, in which the use of a stimulant is beneficial it is extremely useful. An ointment which may be valuable in cases of chronic staphylococcal conjunctivitis is the following:—

R Hydrarg. perchlor.	..	..	1/5 grain
Aq. dest.	..	..	q.s.
Adipis Janæ	..	..	20 grains
Paraff. liq.	..	..	240 minims
Paraff. mollis flav.	..	..	1 ounce

It is inserted between the lids at night, but its use should not be kept up for more than a week at a time, otherwise the effect is apt to become too irritating.

If for any reason it is thought necessary to prescribe a simple eye lotion, boracic acid solution or normal saline is as suitable as any of the much vaunted proprietary preparations. Of these two, normal saline is probably the safest, as certain persons show a definite idiosyncrasy to boracic acid; normal saline is also nearest in composition to the lachrymal secretion. But I do not approve of the regular use of eye lotions for normal eyes. The normal lachrymal secretion is quite adequate; also, it has been shown to possess antiseptic properties, and these are almost certainly destroyed by the use of drugs of any kind.

Infection of the Meibomian glands has been mentioned as a cause contributory to the persistence of a chronic conjunctivitis. When this is present I have found that the massaging of these glands with a glass rod on several occasions, at intervals of a few days, has contributed markedly to the cure of the conjunctivitis.

Chronic conjunctivitis may be secondary to an infection of the lachrymal sac; indeed in any case of obstinate chronic conjunctivitis the condition of the lachrymal sac or sacs should be explored. And this applies especially to infants; it is comparatively common to see babies with intractable conjunctivitis (monocular or binocular) and mucopurulent discharge, in whom the condition is entirely due to a sac infection and clears up completely when the latter has been attended to.

Conjunctivitis in infants, apart from gonococcal conjunctivitis, is most commonly of the mucopurulent type. The infant's conjunctiva is even more sensitive

to irritants than that of the adult, and especially so to mercurial solutions. Hydrarg. oxycyanide should not be used in a stronger solution than 1 : 10,000, and is usually effective if applied three times a day in the form of drops. If much sticky discharge is present, the eyes should be washed out with boracic or normal saline lotion before the drops are applied. After each application a small quantity of boracic ointment or vaseline should be introduced into the conjunctival sac. Argyrol 10 per cent, also applied as drops, is useful as an adjunct to treatment with the mercurial solution, and also as a substitute in cases which do not tolerate the mercurial solution well.

A mild conjunctivitis may occur soon after birth as the result of the use of silver nitrate drops for the prevention of ophthalmia neonatorum, especially when a strength of 2 per cent has been employed. This type of conjunctivitis is a response on the part of the conjunctiva to the chemical irritant and clears up quickly on simple treatment with normal saline or boracic lotion, and vaseline or boracic ointment.

Gonococcal conjunctivitis is so serious a disease that it must always receive expert treatment. Suffice it to say that the most essential factor in its treatment is frequent (in babies) and continuous (in adults) washing out of the conjunctival sac with non-irritating fluid, saline or boracic, in order to prevent, if possible, any prolonged contact between the infected discharge and the corneal surface. As the washing out has to be done so frequently, the use of an antiseptic is not advisable; it would inevitably cause too much irritation. In babies both eyes are usually affected from the start, but in adults the primary infection is monocular. In this latter case the normal eye must at once be hermetically sealed, with strapping and a watch glass (Bullar's shield) to prevent, if possible, any chance of its involvement.

Membranous (diphtheritic) conjunctivitis should be treated on the same lines as are other diphtheritic infections, namely, by subcutaneous injection of anti-toxin. The conjunctival sac should be washed out with simple lotions (e.g., boracic). These cases must, of course, be notified and sent to an isolation hospital.

With regard to the danger of spread of infection in cases of infective conjunctivitis, all varieties are potentially contagious. But the degree of contagiousness varies directly with the copiousness of the discharge, in other words, with the liability of such discharge to reach the contaminate the eyes of other people. Catarrhal conjunctivitis, with its scanty discharge, is but rarely communicated to others, whereas mucopurulent conjunctivitis is notorious as a 'spreader'—it runs through schools with great rapidity.

Peptic Ulcer

By JOHN D. COMRIE, M.A., B.Sc., M.D., F.R.C.P.E.
(From the *Prescriber*, Vol. XXXII, August 1938, p. 241)

THE old theory of Virchow that thrombosis occurs in small blood-vessels of the mucous membrane, with subsequent degeneration and digestion of the surrounding tissues, is probably applicable to some cases, especially in elderly persons in whom arteriosclerosis is present. As a basis for a neurogenic theory of causation, Cushing recorded three cases of cerebellar tumour in which, after apparently successful removal, death had occurred owing to the perforation of an acute peptic ulcer. He noted two other cases which had occurred after similar operations by other surgeons, and two cases after a tumour under the third ventricle. Schiff had already shown experimentally that pontine and medullary lesions were apt to be followed by erosions of the gastric mucous membrane, and Cushing, apart from such gross lesions of the nervous system as a neurogenic cause, is inclined to attribute the prevalence of peptic ulcers in human beings to the general strain and stress of life. Ryle pointed out that duodenal ulcer had doubled in frequency in the decade preceding 1932. He had found that the type of persons

who were preponderantly affected by this condition were restless energetic men with stomach of the steer-horn type and of the ages between thirty and fifty. He was inclined to attribute this increase to general nervous influences on the principle that 'a restless stomach accompanies a restless mind'. Davies later pointed out that emotional upsets were apt to be associated with increased acidity of the gastric juice. Experimental evidence was produced by Matthews and Dragstedt in support of the view that the chemical action of pepsin with hydrochloric acid could by itself produce a typical chronic progressive ulcer in the stomach, duodenum, or lower part of the alimentary canal without any other predisposing cause. Dragstedt went so far as to attribute the origin of the ulcer directly to the amount of hydrochloric acid in the gastric juice, and suggested that 'acid ulcer' would be a more accurate term for the condition than peptic ulcer.

Another important factor in causation has been pointed out by Archer and Graham who suggest that deprivation of vitamin C, which in animal experiments has been found associated with gastric ulcer, is in many cases the main reason for the continuance of a peptic ulcer. They suggest further that a strict diet for peptic ulcer was often lacking in the necessary ascorbic acid, and that recovery is expedited by the administration of two ounces of orange juice daily, or of one dose of one gramme of ascorbic acid followed by administration of thirty-six milligrams of this substance daily thereafter.

Various new methods of treatment or modifications of older methods have also been tried recently. A form of pepsin therapy for gastric and duodenal ulcer was proposed by Glaesner. He recorded 600 cases which had been treated by a course of thirty subcutaneous injections of pepsin sterilized by passage through a porcelain filter, and he claimed recovery for 60 per cent of patients treated in this manner. The method, however, does not seem to have a physiological basis and has not met with general approbation. A method of treatment by application of gastric mucus to the stomach was recommended by Fogelson. This was based on the principle that 100 c.cm. of mucus will inhibit *in vitro* 40 c.cm. of gastric juice. A prolonged course of prepared gastric mucus was administered by ambulatory treatment to 555 patients who at the same time were kept on a bland diet and whose cases were followed for varying periods from six months to three years. Fogelson claimed that in 70 per cent of these cases all the symptoms of peptic ulcer were controlled and that relief was obtained in another 23 per cent. Owing to difficulties in obtaining gastric mucus and repugnance on the part of patients this method has not been adopted by other observers, although Fogelson in a later paper still recommended it and found it had produced benefit in 88 per cent of his cases, having the effect of inhibiting excessive gastric secretion and motor activity.

Considerable discussion has taken place, regarding the comparative value of medical and surgical procedures in the treatment of peptic ulcers. Emery and Monroe in a review of 1,435 cases which they had treated, came to the conclusion that the ultimate results of medical and of surgical treatment were much the same, with recovery in about 32 per cent of cases. They found that peptic ulcer was associated with hæmorrhage as one of its symptoms in over 34 per cent of their cases, and they concluded that a case accompanied by hæmorrhage was entirely a medical problem since the mortality was greater among patients upon whom an operation was performed than among those treated by medical procedures. They obtained the best results by strict adherence to the Sippy regimen of diet. Tidy from a large collection of statistics also came to the conclusion that the same late results followed medical and surgical treatment. The operative mortality, however, lay between 10 and 20 per cent and when gastro-enterostomy was performed, a gastro-jejunal ulcer was liable to form in at least 10 per cent of cases.

Much interest has centered upon the treatment of gastro-duodenal ulcer by injections of histidine monochloride. Weiss and Aron, as the result of animal experiments, concluded that under certain conditions duodenal ulcers developed for want of the duodenal contents containing histidine and other amino-acids which were present in the food but could not be developed by the body. They succeeded in producing healing of these experimental ulcers by injections of histidine and certain of these other amino-acids, and they later applied this treatment with apparent success to twelve patients who were suffering from duodenal ulcer. Bulmer recorded 52 cases with 58 per cent of recovery as shown by disappearance of clinical symptoms confirmed by x-ray examination, and 23 per cent of failure, while numerous other observers in Britain and America have recorded smaller series of cases treated with histidine under various proprietary names (larostidin, stillidin, etc.). Sandweiss made a systematic study of this form of treatment in the following way. He treated 67 patients, of whom the great majority had had symptoms of peptic ulcer for five years or longer, giving them the option of being treated by twenty-four injections of histidine or by administration of diet and alkalis according to the Sippy regimen. The patients who remained unimproved after some four weeks were then treated by the other method, those who had not recovered under histidine injections being put on diet and alkalis, and those who had not recovered under diet and alkalis receiving a course of histidine injections. Thus in all 40 patients were treated with histidine and 53 with diet and alkalis. The results were practically the same in the two classes, but he noted the fact that there was a recurrence of symptoms at a later date in 85 per cent of the patients treated with histidine. As a control to the histidine injections, he treated another series of patients by injections of distilled water, and found that almost the same percentage became free from symptoms with the latter treatment. He concluded therefore that the treatment by diet and alkalis was the most satisfactory, but that as an addition injections of histidine might be useful for what he called 'extra artillery'.

An elaborate series of observations has been carried out by Dr. David Wylie in the wards of the Royal Infirmary, Edinburgh, under the writer's charge. He examined a long series of patients with normal acidity and suffering from hyperchlorhydria with or without gastric ulcer, leaving a small gastric tube in the stomach for twelve hours and taking half-hourly readings of the gastric acidity during this period. He found that in normal degrees of 'free' acidity, hourly administration of three ounces of milk was sufficient to maintain adequate neutralization of the gastric contents. In cases of hyperchlorhydria, the neutralizing action of magnesium trisilicate, calcium carbonate, magnesium oxide, aluminium hydroxide, and tribasic magnesium phosphate was also investigated. Magnesium trisilicate and aluminium hydroxide proved to be the most efficient remedies in maintaining persistent alkalinity, but the original powders recommended by Sippy of calcium carbonate and magnesia combined with sodium bicarbonate were little less efficient. Two-hourly feeds of milk (5 to 6 ounces) and 60 grains of either aluminium hydroxide or of magnesium trisilicate half an hour after the feeds given during the day would almost completely and at all events adequately neutralize the free acid.

The treatment of hæmatemesis from a peptic ulcer has attracted a good deal of attention lately and has involved a discussion of comparative advantages of surgical and of medical treatment. Means expresses the opinion that when a patient has developed a gastric ulcer, he should be treated medically for the rest of his life. With regard to surgery, absolute indications for an operation are the occurrence of perforation, symptoms of obstruction, and a laparotomy to exclude the presence of cancer, but in regard to hæmorrhage, operations should be limited to patients over the age of fifty in whom arteriosclerosis is present and the

hemorrhage may be expected to be recurrent. Finsterer is one of the strongest advocates for a surgical treatment and claims that in a large number of cases he obtained good results in resection of a part of the stomach for hemorrhage, provided that the operation was carried out within forty-eight hours of the occurrence of the hemorrhage, since he admits that the mortality was about 30 per cent at later periods. Still recording 80 cases of simple ulcer in which subtotal gastrectomy had been carried out, met an immediate mortality in 5 per cent of the cases and out of 57 cases whose subsequent history it was possible to trace, 90 per cent were found to have remained in a satisfactory state. Goldman recording the results following large resections for peptic ulcer in 890 patients treated in the Hospital for this condition, found that death occurred much more frequently in cases between the ages of forty and seventy years than at earlier periods of life, and that the mortality rose when hemorrhages were repeated. He concluded, therefore, that surgical intervention should be considered in elderly persons in whom a large hemorrhage had occurred, but that at earlier ages the most effective means of treatment were the administration of morphine and blood transfusion, food being withheld till the hemorrhage ceased. Hurst and Ryle discussing the whole question of hemorrhage in relation to gastric and duodenal ulcer, found that the number of cases of peptic ulcer in which hemorrhage occurred was larger than is generally supposed, this complication occurring in 31 per cent of cases of peptic ulcer, and in 45 per cent of cases in which gastrojejunostomy had been carried out. They concluded therefore that operation was likely to increase the mortality. They considered further that the mortality in cases of hæmatemesis had been grossly exaggerated, for this complication occurred in not more than about 1.5 per cent of cases in general practice, and in about 4.8 per cent among cases admitted to hospital on account presumably of severer hemorrhage. The mortality which occurred after any operation performed on cases of hemorrhage was therefore greater than that found in cases of hemorrhage generally, and moreover the fact had to be remembered that hemorrhage often recurred either from the original site or from the site of anastomosis after an operation had been performed. They considered that the best line of treatment included rest in bed, starvation, and the administration of morphine, while transfusion was occasionally required but not in every case. They did not agree that feeding patients suffering from hemorrhage from the commencement, a procedure recently recommended by several authorities, presented any advantage over starvation in preventing death.

In the treatment of hæmatemesis, withholding of food at the commencement and nutrition by means of glucose, together with administration of morphine and, if necessary, transfusion of blood, is the treatment adopted by the majority of hospital physicians. At a later stage, after the hæmatemesis has ceased the most frequently adopted method of feeding and of checking excessive secretion of hydrochloric acid is by the regimen introduced by Sippy. This consists of administration of milk and cream in small quantities, from three to six ounces at a time every hour or every two hours, with alkaline powders in the intervals, and the gradual addition of eggs, cornflour, puddings, and lighter forms of protein food as the case progresses. Meulengracht recommended that patients suffering from hæmatemesis should be treated from the beginning by a feeding process which he alleged counteracted the shock and anæmia induced by the hemorrhage and led to more rapid recovery. His method consisted in the administration of a purée diet together with an alkaline mixture containing sodium bicarbonate, magnesium carbonate, and extract of hyoseyamus. The diet began in the morning at 6 a.m. with tea, and white bread and butter; at 9 a.m. oatmeal porridge with milk, and bread and butter; at 1 p.m. dinner, including such articles as meat balls, omelette, fish balls, mashed potatoes, vegetable purées, stewed fruit, gruel, and

pudding of rice or tapioca; at 3 p.m. cocoa; and at 6 p.m. white bread and butter, sliced meats, cheese, and tea. He recorded 251 cases in which there had been severe hemorrhage probably due to ulcer, with three deaths, or approximately 2 per cent, which he held was lower than the mortality that followed starvation treatment. He also said that on such a diet melena had continued on the average for 10.2 days only, and that the patients had made a more rapid recovery than they would have done on a starvation treatment. This view however is negated by the observers already quoted.

Woldman recommends a method of carrying out the treatment for neutralization of excessive acidity more thoroughly than by the usual method of administering alkalis hourly or half-hourly. He treated 21 cases by a drip method through a stomach-tube introduced as far as the cardiac end of the stomach, and left in place; through this colloidal aluminium hydroxide, 5 per cent in 0.6 per cent sodium chloride solution was allowed to drip at the rate of ten drops per minute for ten days into the stomach. For food the patients received two ounces of milk and cream every two hours for the first day, and later such semi-fluid foods as cream soups, cereal foods, rice and tapioca puddings, custard, etc. Complete recovery resulted in all his cases.

Summary.—There appears to be general agreement at the present time that the chief factor in the development of most cases of peptic ulcer is the action of hydrochloric acid in excess of digestive requirements, and that nervous states such as over-work and worry influence this. Vascular conditions such as arteriosclerosis play a part, especially in the ulcers of elderly people. Most authorities agree that medical treatment should be pursued in the great majority of cases, this treatment consisting in the administration of bland, semi-fluid diet at frequent intervals, with the addition of alkalis to neutralize the acid. Various forms of alkalis and absorbents have been introduced.

In cases accompanied by severe hemorrhage, most authorities favour temporary reduction of food given by the stomach, administration of morphine, and in occasional cases transfusion of blood, while surgical measures should be restricted to special cases.

Sulphanilamide in the Treatment of Genito-urinary Infections

By ANSON L. CLARK, M.D.

and

D. W. BRANHAM, M.D.

(Abstracted from the *Southern Medical Journal*, Vol. XXXI, April 1938, p. 387)

APPROXIMATELY six months ago the drug sulphanilamide was advanced as a remedy useful in the treatment of various infectious conditions of the genito-urinary tract. In that period of time a rather extensive clinical trial has been given to the substance, making it possible now to evaluate to some extent its therapeutic usefulness and also its limitations.

The reception given to every new discovery in the field of medicine has been ingeniously reduced to a graph by Edwin Davis, who points out that new medications and procedures of definite worth invariably follow a set path of acceptance in the minds of the medical profession. This course of evaluation begins with general indifference, which presently gives place to over-enthusiastic approval, sometimes commercially inspired by drug houses selling the preparation, or fostered by newspaper publicity; next, accidents occur, and pessimism supervenes, until finally, after a seesaw between hopes and fears, an awakening to the true therapeutic value of the drug or preparation arrives, and the substance reaches stability at its proper level of acceptance. This is running true to this form.

Following the work of the German chemists, Mietzsch and Klarer, on azo compounds, which resulted in the

discovery of substances with far greater action on bacteria than any azo compounds previously measured, Doinagk observed an interesting activity on the part of certain of these compounds containing sulphonamide in the streptococcal sepsis of mice. Next came the discovery that the azo radical could be eliminated without impairing the antistreptococcal action. From this as a starting point came 'prontylin', which is para-aminobenzene sulphonamide, first used therapeutically in Germany under the name of 'streptozon' and later as sulphanilamide. Curiously enough the new compound displayed almost no disinfectant action *in vitro* and it had no effect of any kind upon healthy mice, but its action upon certain strains of streptococci seemed specific. Against the staphylococcus also it was strongly bactericidal, while the effect upon the pneumococcus was to inhibit its growth.

The first American report was made by Long and Bliss early in 1937, on the basis of 70 cases treated, with four deaths, only one of which, however, could fairly be attributed to failure of the treatment. Shortly afterwards, Helmholz reported that the urine of patients to whom sulphanilamide has been administered develops definite bactericidal properties against such organisms as commonly flourish within the urinary tract. Among these, he found the staphylococcus to be the most easily affected, while at the other end of the range stands *Streptococcus faecalis*, which continues to grow luxuriantly in urine that will completely inhibit the growth of the Gram-negative group in twenty-four hours. He also observed that the new drug is more effective in alkaline than in acid urine, and that the urine tends to be alkaline after its administration. He expressed the view that its ease of administration, its action in alkaline urine and its successful use in clearing up infections resistant to mandelic acid made it a urinary antiseptic of great value.

Then Dees and Colston, working at Johns Hopkins University Hospital, recorded that sulphanilamide has a definite bactericidal effect on the gonococcus. Since it is difficult to infect animals with this organism, they tried the clinical application of the new drug in 19 cases of gonococcal infection, finding that in nearly all instances the discharge disappeared within 1 to 4 days after treatment was instituted, and most of the smears were negative for gonococci in 2 to 5 days.

Because these authorities have been widely quoted we wish to emphasize at this time that while negative smears may be obtained in 2 to 5 days it does not mean that the infection has been eliminated. In numerous instances where a short course of the drug is given the organism will again be found in the urethra within 10 to 12 days after the medication is stopped. Careful observation and frequent tests of cure are important when sulphanilamide is used in treating gonorrhœa.

Dees and Colston were also impressed with the fact that the infection had not extended from the anterior to the posterior urethra, thereby minimizing possible complicating factors, and in this we heartily concur. Since February 1937, we have been using sulphanilamide at our clinic in genito-urinary infections of the most varied kind, and it is our opinion that its therapeutic value in these conditions when properly administered is important.

NON-SPECIFIC INFECTION OF THE URINARY TRACT

Pyelitis.—In our experience acute upper urinary tract infections respond quite satisfactorily to the medication, except in cases of stone or stasis, where of course the causative factor must be removed before infection can yield to treatment by chemotherapy. In other conditions we feel that the course of the infection is materially shortened clinically and the symptoms are ameliorated. This is evidenced by a more rapid fall in temperature and by clearing of the urine. Where sulphanilamide cannot be administered by mouth because of gastric intolerance, we have successfully given it in 0.8 per cent solution by hypodermoclysis. Acute bacillary infections of the

kidney have responded more satisfactorily than the coccal infections.

Cystitis.—Administration of the drug in instances where bladder infections occur following surgical procedures on the bladder neck has not been particularly successful, especially in the first few post-operative weeks. When, however, sufficient time has elapsed for all necrotic material to be eliminated from the operative area, sulphanilamide is an aid in relieving the residual infection.

Acute trigonal cystitis, seen often in women, and usually of bacillary origin, is uniformly aided by the drug. Rarely will acute bladder symptoms persist more than twenty-four hours after its administration. Nevertheless, it is advisable to continue therapy until the offending organism has been completely eradicated.

Non-specific prostatitis.—Results obtained in non-specific infection of the prostate where the gonococcus is not present have not been altogether satisfactory. Although administration of sulphanilamide will produce a decrease in the extent of the infection, revealed by microscopic examination of the expressed secretion, recurrences are frequent when the drug is discontinued. Neither persistence in the medication nor the size of the dose seems to alter the situation materially. Twenty to thirty grains of the drug will produce as much benefit as a more massive dosage. For the desired results more dependence must be placed on regular prostatic massage over a sufficient period of time.

In our experience the administration of sulphanilamide in small doses (30 grains daily) for a few days before operative procedures are performed on the urinary tract reduces the intensity of possible post-operative reactions. In cystoscopic manipulation for urethral calculi, fulguration of urethral conditions, or prostatic resections it is evident that the drug by inhibiting bacterial growth shortens the convalescent period.

GONOCOCCUS INFECTION

When one realizes that this medication is not specific for gonococcal infections it may be said that our results obtained in the treatment of gonorrhœa have been quite satisfactory. Over 300 such patients have been treated with the preparation, the majority of these being in private practice. Sulphanilamide therapy in dispensary patients is accompanied by difficulties because of an inability to observe the progress in these patients until a definite cure has been accomplished. Invariably this class of patients fails to return to the clinic when gross evidence of their infection disappears. A false sense of security is engendered in them through the erroneous belief that they have been cured and as a result they will return to normal sexual activities, thereby causing a wider spread of the disease. As a point in the public health control of gonorrhœa we feel that this phase of sulphanilamide therapy has not been sufficiently emphasized.

In acute anterior urethritis of gonococcal origin we have found the drug most useful in preventing posterior complications and extension. It must be remembered, however, that the ultimate cure is brought about by the patient's own immunological response to the infecting organism. If the drug so inhibits the growth of the gonococcus that this immunological reaction is lessened or slowed down, the complete cure may be hindered instead of hastened. We must also bear in mind that by lessening the discharge sulphanilamide eliminates evidence of the disease, allowing the patients, and sometimes even the physicians, to think that a cure has been accomplished when this is not the case. In this way the possible spread of the disease may actually be encouraged.

DOSAGE OF SULPHANILAMIDE

It has been our aim to keep the dosage of the drug within reasonable bounds. We do not share the view of Dees and Colston, of Long and Bliss and certain other authors that it is important to administer a

large amount (80 grains) during the first twenty-four hours of treatment, and then lessen the dose by a third or a half on the third and fourth days. It has not been necessary to give more than 60 grains daily (divided into 4 doses) for two days; we cut this down to 40 grains for the next five days, and to 30 grains during the second week. If renal function is poor, and there is evidence of possible lack of tolerance, the initial dose is smaller than 60 grains. A dosage of 80 grains a day for two days, which was first advised for streptococcal infections, is in our opinion unnecessarily large for the average patient who is ambulant and attempting to work and will invite complications.

Experience has shown that no standard dose can be established since the amount must vary with the individual patient. In younger patients the kidneys will excrete the drug more rapidly, and will thus lessen the blood level of the drug. On the other hand, if the substance is excreted slowly by the kidneys, the blood level will be raised, even though the dosage of the drug is small. This possibility of impaired renal function must always be taken into consideration.

Some urologists, as Cook and Buchtel, begin not with large doses that are to be decreased, but in just the opposite way: Walther, for example, writes that he considers it much safer to begin with definitely small doses (18 grains daily = 1.2 gramme) for two days, and then to increase these if they are well tolerated. Beginning then with the fourth day, he gradually increases the amount until he reaches 80 grains daily.

Rarely is the drug given for more than two weeks, for it is found that the optimal results are obtained within this length of time. The first ten days are the golden period of therapeutics so far as sulphanilamide is concerned. Doubtless the offending organisms by that time have built a tolerance toward the medication that hinders a complete cure. Furthermore, we believe on general principles that continuous medication with one and the same preparation over long periods of time is fraught with danger, because of the possible cumulative effect. With sulphanilamide this danger would seem especially great, due to its possible depressing effect upon the hematopoietic system.

COMPLICATIONS

Serious complications encountered in our experience with the drug have been surprisingly few. We believe that our conservatism in dosage, together with frequent observation of the patient, contributes to this end. We are of the opinion that the drug is of such importance as a therapeutic agent and holds such potentiality for development of serious complications if carelessly administered, that no patient should be entrusted with it for any length of time without close medical observation. No need has been felt for daily blood counts to determine whether anaemia is present, since the general appearance and state of well-being of the patient have in all cases given a sufficient hint to the physician. Whenever any undue difficulty is encountered, cessation of medication has uniformly resulted in rapid improvement. As an added safeguard, the drug is dispensed from the office only in such quantities that no more than two or three days' supply is held by the patient.

Among specific complications met with, skin manifestations have constituted the majority. In the few dermatoses that have been produced, it has been possible to discontinue the drug for a few days and return to it at a later date when the eruption has disappeared; and in no cases has there been a recurrence, although this has been frequently reported by other writers. Practically all the patients complain of dizziness and lassitude, together with loss of appetite. Unless these symptoms are unusually severe, they are ignored, as we feel they indicate satisfactory systemic absorption. By the second week these manifestations usually diminish in intensity. In this series no serious instances of anaemia have developed, as some authors have reported. One patient developed an optic neuritis while under treatment, which may have been due to

the drug. Fortunately this condition improved upon withdrawal of the drug.

Sulphamides, such as methæmoglobinæmia, again, which a number of authors have uttered a warning, have not been observed among our patients. Caution is observed that no magnesium sulphate or other saline cathartics are taken with the sulphanilamide, nor do we allow any other adjuvant medication except sodium bicarbonate.

Before leaving the subject of complications, it seems that reference should be made to the very recent reports of 73 deaths from the use of a so-called 'elixir of sulphanilamide' that has been sold without its producers having tested its properties. Investigation has brought to light the fact that these deaths were probably due to the presence of large amounts of diethylene glycol, and not to the sulphanilamide ingredient. The chief symptom in these fatal cases was anuria, which has never been observed following the ingestion of sulphanilamide, but which has now been shown by animal experimentation in the laboratories of the American Medical Association to follow the use of diethylene glycol. The latter substance is not a pharmaceutical remedy, but a toxic preparation used in the mechanical arts, entirely unsuitable for human consumption.

RESULTS IN TREATMENT OF GONORRHOEA

An evaluation of the results obtained with this type of medication in gonorrhœa is still somewhat difficult. We feel that the benefit accruing from shortening the length of time of active symptoms and the lessened number of complications as compared with that of the past has shown the drug to be a very valuable adjunct in treatment of gonorrhœa. In our hands, however, it has not replaced the more accepted methods of treatment for this disease.

As the cure of gonorrhœa is based on a personally developed immunologic reaction between host and organism, and as stimulating local therapy in conjunction with proper hygienic control of the patient is a potent factor in promoting this immunity, we have been loth to dispense with these time-honoured methods of treatment. For these reasons, patients are given the same therapeutic routine as formerly, and sufficient time of observation is taken before they are discharged as cured.

Briefly our records show: ten per cent of the patients with an acute anterior gonococcal urethritis treated with sulphanilamide will apparently be radically cured within forty-eight hours. By a radical cure we mean that continuous observation of these individuals over a period of weeks combined with repeated 'tests of cure' produced no evidence of the disease. Seventy-five per cent of patients will be improved by administration of the drug as shown by diminution in the amount of urethral discharge, with recovery completed at the end of four to six weeks. Fifteen per cent of patients seem to obtain no therapeutic results whatever with the medication. They continue to have signs and symptoms of infection for long periods of time, with or without complications in the form of acute and chronic prostatitis. However, serious complications have been markedly reduced and those that do occur may be explained as due to a lack of normal resistance to the disease or on a basis of poor behaviour. The acute symptoms of posterior urethritis are rapidly relieved by the drug. The benefit from sulphanilamide in acute epididymitis has been less spectacular. It apparently does not materially shorten the course or intensity of this complication. In our experience, acute iridocyclitis and arthritis have also been disappointing in response to this treatment.

The results in chronic gonococcal infections, occurring in those who have not received the drug previously, have been extremely satisfactory. Chronic prostatitis of gonococcal origin is apparently rapidly improved by the medication, as determined by examination of the expressed prostatic secretion and appearance of the

urine. If, however, non-specific infection be present as a complicating factor, the end results are not satisfactory. As these non-specific infections of the prostate gland constitute a large proportion of the infectious pathologic conditions of this gland, and as it is practically impossible to differentiate these from gonococcal infections, the difficulty is obvious in evaluating this phase of therapeutic benefit.

Peri-urethral infection of gonococcal origin has been less favourably influenced by the drug than prostatitis. In such cases we find that infection tends to persist, and more dependence must be placed on local measures. Possibly the concentration of the drug when it is excreted in the prostate gland is much higher than

that which obtains in the glandular structure of the anterior urethra.

In conclusion, sulphanilamide is a valuable therapeutic measure for use in genito-urinary infections. When it is properly employed, with strict attention to its capacity for producing harm and a clear knowledge of its limitations, it is a worthy addition to our medicinal armamentarium. At times the results produced in combating gonorrhoea are spectacular, but it frequently masks the signs and symptoms without eradicating the infection completely. Provided the physician is aware of this fact, it will prove to be a drug of tremendous merit in diminishing the clinical intensity of the disease.

Reviews

THE BRITISH ENCYCLOPÆDIA OF MEDICAL PRACTICE.—Under the General Editorship of Sir Humphry Rolleston, Bt., G.C.V.O., K.C.B., M.D., D.Sc., D.C.L., LL.D. 1938. Butterworth and Company, Limited, London. (To be completed in 11 volumes.) Sold in complete sets only. Cash price, Rs. 25 per volume. Also available on the instalment system at Rs. 10 per month. Price, Rs. 26-8 per volume. Only available from Messrs. Butterworth and Company (India), Limited, Calcutta. Volume VI. Pp. xx plus 602 plus 48

The range of this volume is from 'gonorrhoea to hydrotherapy'; the picture that this conjures up in the reviewer's mind is of an elderly man being wheeled round Harrogate in a bath chair. This is not the only volume in which the range is suggestive of a natural sequence of events and one might almost accuse the editor of chopping off the volumes at appropriate places, e.g., 'abdominal pain to appendicitis' (vol. 1), and 'diarrhoea to endoscopy of the rectum' (vol. 4), were it not impossible to suspect Sir Humphry of such levity, more appropriate to the idle fancies of a dilettante reviewer.

The first chapter is by Colonel Harrison, whose name one associates with some of the best work on this important but very difficult subject, gonorrhoea. It is still one of the most difficult of the non-fatal diseases to treat, and, though much progress has been made during the years since the last war, nothing really dramatic in the way of a specific has been found to help the physician, and the 'management' of the case is still the most important side of treatment. It is possible that a specific may be found in the sulphanilamide group of drugs, but when this chapter was written few of these had been tried and even now no finality has been reached. After a general introduction, the subject is dealt with under three main headings, gonorrhoea in males, in adult females, and in female children (vulvo-vaginitis).

Another venereal disease that is included in this volume is granuloma venereum which is described by Dr. R. V. Rajam; his contribution is based mainly on experience that he has reported from time to time in this journal. This chapter is followed by one on another disease very prevalent in India, guinea-worm infection; Colonel Liston who contributed this chapter made a special study of this subject when he was in India, and, though it is fifteen years or more since he retired, he has still maintained his interest in the subject.

Hydatid disease can claim a world-wide distribution, but it appears to have attracted far more attention in Australia than anywhere else in the world and it is therefore appropriate that this chapter should be contributed by the professor of surgery at Sydney University, Harold R. Dew, whose name is well known in connection with this disease.

A large section of this volume, nearly two hundred pages, is devoted to heart disease; the subject has been divided up into nine sections, congenital diseases, rheumatic heart diseases in children, pericardium diseases, endocarditis, malignant and non-malignant, mitral valve diseases, aortic valve diseases, right side diseases, and heart failure, and each section is contributed by a different writer, except that Dr. A. G. Gibson has written two sections. There is a certain amount of overlapping, but skilful editing has reduced this to a minimum.

The section on Hodgkin's Disease is written by a bacteriologist, Dr. M. H. Gordon, and a physician, Dr. A. E. Gow, with the editor acting as referee, so that this short chapter of only 12 pages of text has three names at its head. However painful was its birth—and it must have been a difficult labour to require three doctors—the chapter is a clear and concise presentation of the subject, in which present work on elementary bodies is not overstressed, though these have added a welcome relief, in the way of a hopeful note, to the otherwise distressing negativeness of the section on treatment of this fatal disease.

The chapter on heat stroke and heat exhaustion is written by Dr. Frank Marsh who is working with the Anglo-Iranian Oil Company at Abadan. A good account of the aetiology, physiology, pathology, symptomatology, treatment and prophylaxis of this condition is given by one who has obviously had considerable first-hand experience of morbid states due directly to excessive heat. There are few places in the world better than the Persian gulf for studying these conditions.

The same uniformly high standard of teaching and writing is maintained in all the chapters of this volume.

A TEXTBOOK OF HISTOLOGY: FUNCTIONAL SIGNIFICANCE OF CELLS AND INTERCELLULAR SUBSTANCES.—By E. B. Cowdry. Second Edition. 1938. Henry Kimpton, London. Pp. 600. Illustrated. Price, 31s. 6d.

It is very embarrassing for a reviewer, when he has just expressed the opinion that one book is the best book on the subject available at present, to receive another, which, if it is not better as a whole, has some sections that he considers quite definitely superior to the corresponding ones in the first. As it is better to avoid comparisons the reviewer will compromise by saying that, whilst he is prepared to stand by his original decision as to the suitability of the other book for the medical student, the physician and research worker will find the present book as useful; they should, in fact, be in a position to consult both.

The present edition is a considerably enlarged one; the book has been very extensively rearranged and about a hundred pages added. An introduction that did not appear in the first edition has been written for this one; it commences with an historical outline,

defines histology, and describes the organization of the body and the individual cell; an orthodox diagram showing cell division is given but there is also an interesting one contrasting the sizes of cells, from the filtrable of 0.02μ to the nerve cell fibre of $1,000,000\mu$; it is altogether a very suitable introductory chapter.

The chapters on the different blood cells have been revised very thoroughly and one on the formation and destruction of blood cells added. These are all good chapters, but perhaps one of the best is on the spleen. In no book have we seen the functional mechanism of the spleen explained so clearly.

The book is no mere compilation; the individuality of the author is reflected from every page. On the other hand dogmatic statement on any subject in which there is a possibility of division of opinion is always avoided; in fact, in the case of some of the most acutely controversial subjects, the author introduces the protagonists and then steps out of the ring, not as the judge but as a spectator, and often a mildly amused spectator.

The first edition of this book was a good one, but the second is very much better. The illustrations, both the diagrams and the photomicrographs, which are numerous, are relevant and clear; the former will give the student who is just commencing his studies a clearer conception of the subject than would many pages of description. For this and many other reasons we can recommend the book strongly to teachers in medical schools and colleges, as well as to physicians and research workers.

THE FUNCTIONS OF HUMAN VOLUNTARY MUSCLES.—By Norman D. Royle, M.D., Ch.M., F.R.A.C.S. 1938. Angus and Robertson, Limited, Sydney and London. Pp. 42. Illustrated. Price, 3s. 6d.

THIS little volume is a collection of lectures which the author delivered some years ago in the department of anatomy of the University of Sydney. There are four chapters dealing with different aspects of the functions of human voluntary muscles. Muscle tone has been described from two aspects. Firstly, the pre-spinal or extensor tone, affecting the anti-gravity muscles, is described as proprioceptive in origin but as absent in resting muscle. Secondly, spinal, or plastic tone, is said to appear with the onset of active contraction. Muscle tone is, therefore, regarded as 'a proprioceptive reflex action subserving active movements by taking up slack in muscle'. Both mechanisms are subserved, in the author's opinion, by the sympathetic nervous system which controls only blood vessels.

This view of muscle tone may not find general acceptance, but we agree with Professor Burkitt, who writes an informative introduction, that in this book the student and the clinical observer will find much that is worthy of attention and, indeed, much that is new.

P. N. R.

EVERYDAY SURGERY.—By L. Rogers, M.Sc., F.R.C.S.E., F.R.A.C.S., F.A.C.S., and A. L. d'Abreu, M.B., Ch.M., F.R.C.S. 1938. Edward Arnold and Company, London. Pp. xii plus 280, with 160 illustrations. Price, 12s. 6d.

THIS handy book is a daring effort to present in a concise form what may be regarded as the best in modern surgical practice of an everyday, as opposed to unusual or special, character. In an appropriate introduction Professor Grey Turner says that the purpose of this book is to 'smooth away difficulties and to focus attention on essentials' and that it is 'to be looked upon as a guide in emergency or as a remembrancer in times of stress and trouble'.

Consisting of twenty-four chapters, it adequately covers the whole of general surgery, but it must not for this reason be presumed to belong to the same class as the so-called 'aids' which only stimulate cramming. Special branches of surgery, such as ophthalmology,

gynaecology and oto-rhino-laryngology are naturally not included in this survey. It is a book which can be strongly recommended to the surgical dresser and even to the general practitioner. The printing, get-up, and illustrations are all praiseworthy.

P. N. R.

MINOR MEDICAL OPERATIONS: FOR SENIOR MEDICAL STUDENTS AND RECENTLY QUALIFIED PRACTITIONERS.—By K. Harris, M.A., M.D. (Cantab.), F.R.C.P. (Lond.), and E. Harris, M.B., B.S. (Lond.), D.P.H. (Eng.). 1938. H. K. Lewis and Company, Limited, London. Pp. x plus 198, with 41 illustrations. Price, 7s. 6d.

IN this book the authors have described the common practical procedures that have to be adopted in medical practice. The book is divided into two parts: the first part consists of sections dealing with the procedures and minor operative measures, such as paracentesis of the pleura, pericardium or peritoneum, artificial pneumothorax, venesection, blood transfusion, mechanical drainage of oedema, and lumbar and cisternal punctures, that are needed for the investigation and treatment of the diseases of the various systems, besides the methods of giving injections, administration of saline by different routes and of doing the various skin tests; the second part deals with the various nursing procedures and medical measures, such as the administration of oxygen and the use of the steam tent, and with the preparation of some common invalid diets, upon which the doctor may be expected to advise.

The sections are well written with an eye to detail, and the descriptions of the various methods are adequate. The instruments and apparatus described are those that are most commonly employed and are relatively simple to use. No attempt has been made, and rightly, to describe all the different methods and apparatuses that may be used in a medical operation.

Inclusion of descriptions of methods of making thin and thick blood smears, and of puncture of the spleen, liver, lymph glands and sternum, that are of so much use in diagnosis, would have enhanced the value of this book to medical practitioners in the tropics. Regarding the alcohol test meal, the meal that is more commonly used is 100 c.cm. of 7 per cent alcohol and not 50 c.cm., and the amount of histamine that is quite sufficient is 0.5 mgm.; higher doses may give rise to unpleasant symptoms. Regarding the administration of saline subcutaneously, the outer side of the thigh is regarded as the site of choice in the bigger hospitals of this country, in preference to infra-mammary and pectoral regions and abdominal wall.

This book will prove valuable for the purpose of reference to qualified medical practitioners, and senior medical students.

THE STUFF WE'RE MADE OF.—By W. O. Kermack, M.A., D.Sc., LL.D., and P. Eggleton, D.Sc. 1938. Edward Arnold and Company, London. Pp. viii plus 342. Illustrated. Price, 7s. 6d.

THIS small book was read with great interest by the reviewer, because it gives in clear and simple language a statement of the modern conception of atomic and molecular structure accompanied by examples drawn from everyday life. It also demonstrates the great importance in modern medicine of the subject styled 'bio-chemistry'.

Twenty years ago the detailed knowledge of how to investigate chemical reactions as they occur in the body as opposed to the test tube was a rare accomplishment almost exclusively confined to a group of specialized chemists without medical training. Nowadays medically trained individuals who are also skilled biochemists are numerous and the work they are doing necessitates all practitioners who wish to keep up with the times having at least a smattering of the subject and a clear knowledge of what such things as enzymes, amino-acids and polypeptides are, and what is meant by certain definite chemical groups such as methyl, carboxyl, etc.

This information will be found in the book under review and it is given in such clear language accompanied by simple and practical examples from daily experience that the reading of it is a real pleasure. It is strongly recommended to all students at the outset of their careers to enable them to approach the difficult subject of biochemistry with confidence, and in the reviewer's opinion it will be even more valuable to those doctors who qualified in pre-biochemistry days for it will turn their probably somewhat vague knowledge of the subject into a clear appreciation of

the main principles of this comparatively new branch of chemical science.

JALER PRAKRITI O PRAYOG. WRITTEN IN BENGALI.—By Dr. B. B. Pal, L.M.S. Published by N. B. Pal, 39/5/1A, Gopalnagar Road, Allpur, Calcutta. Pp. 66

THIS little book deals with physical properties, chemistry and uses of water. Hydrotherapy has been described in detail. The book will be found useful to the general public and Indian nurses.

Abstracts from Reports

ANNUAL REPORT ON THE WORKING OF HOSPITALS AND DISPENSARIES IN THE PRESIDENCY OF BENGAL FOR THE YEAR 1936. BY MAJOR-GENERAL D. P. GOIL, K.H.P., M.B., Ch.B., F.R.C.S.E., I.M.S., SURGEON-GENERAL WITH THE GOVERNMENT OF BENGAL

DURING the year under report there was marked improvement in the work of medical relief both in the Presidency town (Calcutta) and in the mofussil. The number of hospitals and dispensaries increased by 49, and 31 temporary dispensaries were made permanent. The number of beds in the hospitals increased by 506. The daily average of patients in the indoor departments increased by 130 in Calcutta and 140 in the mofussil, and that in the outdoor departments by 108 and 1,910, respectively.

X-ray installations are now available in 15 of the mofussil hospitals as against 12 in 1935.

The popularity of the hospitals both in Calcutta and in the mofussil is steadily growing.

The opening of the up-to-date and well-equipped Sir John Anderson Casualty Block in the Medical College Hospitals early this year with 40 beds and 4 cabins fills a great want and emergent cases can now be dealt with much more promptly than before.

The proposal of re-building the Lady Dufferin Victoria Hospital, Calcutta, with staff quarters, etc., made rapid progress during the year under report.

The Sadar hospitals in most of the districts have gained much in popularity with the opening of x-ray maternity, eye, ear, nose and throat clinics, the need for which was being felt more and more by the people in the mofussil. In order to facilitate the working of these special branches without entailing extra burden on Government and the local authority, a scheme for the employment of competent private medical practitioners in an honorary capacity has been evolved and approved by Government. It is hoped that with the co-operation of these qualified non-official workers the institutions in the mofussil will be able to render medical assistance of a much higher standard than has been possible hitherto.

The condition of Sadar hospitals as a whole, however, is still far from satisfactory. The resources of these institutions are being strained to their utmost capacity.

Medical aid in rural areas is still inadequate. There are now 1,102 hospitals and dispensaries in the rural areas, and apart from these there are reported to be 2,177 qualified private medical practitioners settled in such areas in the province. This makes a total of 3,279 practitioners in rural areas and allows on an average only one medical practitioner for over 13,740 people according to the census of 1931. Now that a large number of qualified medical men are coming out of the medical schools every year, ways and means must be devised to establish dispensaries in rural areas, so that better medical aid may be made available and means of livelihood may be found at the same time, for the new recruits to the profession.

Considerable increase in the number of tuberculous patients is noticeable in the figures. The question of

establishing a tuberculosis sanatorium in the province has been under consideration for the last three years. Thanks to the generosity of Babu Ram Kumar Bangur, who has come forward with a gift of Rs. 2,80,000 for the purpose, there are definite prospects of the scheme materializing before long.

In co-operation with the Public Health Department steps are also being taken to set up tuberculosis clinics at district headquarters hospitals possessing an x-ray plant and for a tuberculosis survey to be carried out.

ANNUAL PUBLIC HEALTH REPORT OF THE PROVINCE OF ASSAM FOR THE YEAR 1936. BY DR. S. H. PAUL, M.R.C.S. (ENG.), D.P.H. (LOND.), ETC., DIRECTOR OF PUBLIC HEALTH

THE total number of births registered during the year under review was 239,704, yielding a birth rate of 30.24 per 1,000 of population as compared with 239,898 and 30.26 respectively in the preceding year. The number of births registered in 1936 was lower than that recorded in 1935 by 194.

The total number of deaths registered during the year under report was 155,601, yielding a death rate of 19.63 per mille of population, as compared with 169,723 and 21.41 respectively in the preceding year. The quinquennial average was 19.80.

The state of health in the province during the year under review was satisfactory. Deaths under all heads of mortality with the exception of some increase under 'smallpox' were smaller during the year 1936.

A total of 155,601 deaths occurred during the year, viz, 3,816 from cholera, 963 from smallpox, 97,240 from fevers, 11,113 from dysentery and diarrhoea, 6,425 from respiratory diseases, 2,042 from injuries and 34,002 from all other causes.

Cholera.—The total number of deaths from cholera reported during the year was 3,816 as compared with 7,436 in 1935. The death rate per 1,000 population was 0.48 against 0.94 in the preceding year. The decennial average was 0.91.

Smallpox.—The total number of deaths from smallpox during the year under report was 963 as compared with 529 in 1935 showing an increase of 434 deaths. The death rate was 0.12 per mille as compared with 0.07 in 1935 and 0.30 the decennial average.

Fevers.—The total number of deaths from fevers during the year under review was 97,240 as compared with 106,719 in 1935. This shows a decrease of 9,479. The death rate per mille was 12.27 as compared with 13.46 in the preceding year and 11.97 during the last decennium as shown in the table.

Dysentery and diarrhoea.—The total number of deaths registered from dysentery and diarrhoea during the year was 11,113 as compared with 10,947 in 1935. The corresponding death rates for the two years were 1.40 and 1.38 respectively. The decennial average was 1.19.

Respiratory diseases.—A total of 6,425 deaths occurred from these diseases during the year under report as compared with 7,022 in the preceding year,

yielding, death rates of 0.81 and 0.89 respectively. The quinquennial average was 0.76.

Epidemic dropsy.—An outbreak of epidemic dropsy was reported from the area under Kulaura Police Station in the Sylhet district. An Epidemic Unit Sub-Assistant Surgeon was deputed to deal with the outbreak. He detected a large number of patients and directed them to undergo treatment in the Kulaura dispensary.

Yaws.—During the year under report 3,496 cases of yaws were treated against 4,201 in 1935. The decrease of 705 in the number of cases treated is mainly due to the fall in the Goalpara, Kamrup and Nowgong districts. The largest decrease (635) was in the Goalpara district. This was due to the fact that Goalpara Local Board did not provide adequate funds for drugs for the treatment of yaws cases in the local board dispensary.

Kala-azar.—The number of deaths from kala-azar was less in 1936 by 92 than that of the preceding year. The number of patients treated fell from 11,100 in 1935 to 10,587 in 1936. The conditions in individual districts appear to have remained practically the same as in previous year.

Leprosy.—During the year under report, 4,847 lepers received treatment in the leper asylums and other centres.

Maternity and Child Welfare

The number of child welfare centres during the year under report remained the same, viz. five as in the preceding year. The work of the *dai* training classes at Silchar, Karimganj and Sylhet was satisfactory during the year. The centre at Doom Dooma continued its work during the year. A total of 36,152 infants died during 1936, giving a rate of 150.82. During the year 99 infants died daily in the province. This appalling rate of mortality of infants can be reduced considerably if a larger number of up-to-date Maternity and Child Welfare centres are opened throughout the province and a larger number of midwives are made available.

NOTES ON THE ANNUAL RETURNS OF THE HOSPITALS AND DISPENSARIES IN BIHAR FOR THE YEAR 1936. BY LIEUT.-COL. H. STOTT, O.B.E., M.D., F.R.C.P.II., D.P.H., I.M.S., INSPECTOR-GENERAL OF CIVIL HOSPITALS

The special feature of this year was the separation of Orissa from the Province of Bihar and Orissa and its inauguration into a new province from the 1st April, 1936. For the sake of convenience the statistics for the whole year for the districts transferred to Orissa will be shown in the annual report for 1936 of that province.

The number of hospitals and dispensaries in the combined province was 690 at the beginning of the year. Out of these, 104 were transferred to the new province leaving 586 in Bihar. The year closed with the same number of hospitals and dispensaries as it opened with.

The total number of in-patients treated in the state, public, local fund, private aided and subsidized hospitals and dispensaries was 77,014 against 72,713 in 1935, the corresponding figures for the out-patients were 5,198,848 and 4,749,434 respectively. The increase in the number of patients during the year under report is satisfactory.

The total number of patients treated in all classes of hospitals and dispensaries in the province was 6,624,488 against 6,177,313 in 1935. The total number of beds available in all classes of hospitals and dispensaries was 3,402 for males and 1,726 for females. There were 5,485 deaths from various diseases in all hospitals and dispensaries in the province.

Tuberculosis.—A scheme for organizing the treatment of tuberculosis all round the province has been considered and a committee has been formed under the auspices of the King George V Memorial Fund Association to work it out, of which the Inspector-General

of Civil Hospitals, Bihar, is the Honorary Secretary. The aim of the committee is to open tuberculosis clinics at the headquarters of all the districts in the province.

Leprosy and lepers.—There are now five leper asylums and one leper colony in the province with total accommodation of 1,851. The number of leper residents in them in 1936 was 2,104 against 1,844 in 1935 and the number of out-door patients treated in these leper asylums and colony was 3,491 against 4,625 of 1935.

KING EDWARD VII MEMORIAL PASTEUR INSTITUTE AND MEDICAL RESEARCH INSTITUTE, SHILLONG. THE TWENTIETH ANNUAL REPORT FOR THE YEAR ENDING 31ST DECEMBER, 1936

Antirabic Section.—From the beginning of the year under review, the vaccine was prepared from the Paris strain of fixed virus instead of the Kasauli virus formerly used.

The introduction of Paris vaccine has not apparently been followed by the improvement hoped for. It is probable that the results of treatment might be improved by the use of the vaccine in larger doses comparable to those given by most Pasteur Institutes in India. This, however, involves a considerably more complicated system of dosage than that now used and it is doubtful how far the introduction of further complications is justifiable where most of the cases are seen and treated at out-centres where antirabic treatment is only a minor part of the work of busy medical officers. It must be remembered, however, when considering our results, that in an institute where comparatively few patients are treated, one or two deaths more or less, such, for example, as may result from an unlucky run of severe cases at a particular centre, make a very big difference in the general death rate. This year, for instance, one centre had four deaths out of 146 persons treated, but all four were bitten by rabid jackals—notoriously dangerous bites—and all had received severe multiple injuries. Two of these cases were bitten by the same animal, both bitten on the head, both started treatment a week later and one died during treatment. No form of treatment known at present could, it is believed, have saved these two cases.

There was one case of 'paralytic accident' during the year.

The history of the case, kindly supplied by the medical officer in charge of the centre, is as follows:—

D. F. D., European male, 35 years. Contact with a horse certified by a Veterinary Sub-Assistant Surgeon as rabid. The patient was put on class II treatment, i.e., 4 c.c. vaccine for 14 days.

The patient had been vaccinated on 6th April—very mild modified success.

10th April, 1936.—Antirabic treatment begun—4 c.c. daily from 10th to 16th April. Then ceased treatment against advice and went away for the week-end. Returned on 20th April with fever. Treatment resumed on 21st, 4 c.c. daily as before, but only continued for 3 days.

21st April. Headache and muscular pains.

22nd April. Painful spasms of muscles.

23rd April. Dull and apathetic—paresis of both legs with paræsthesia and loss of knee jerks.

24th April. Flaccid paralysis of both legs—all reflexes gone. The paralysis spread up to the umbilicus with paræsthesia and tingling and numbness of both hands and arms and paresis of the left forearm. Loss of sphincter control.

28th April. Condition has become stationary.

1st May. Slight signs of improvement. Some movement of left hand.

15th May. Plantar reflexes extensor, and muscular twitching in legs and thighs. Can open and close left hand. No knee jerks.

26th May. Left for home. Left hand and arm paresis much improved. Both legs paralysed, but signs of movement in the left leg.

9th July. Admitted to Tropical Diseases Hospital, London. Left leg nearly normal. Right improving slowly. With assistance can walk a few steps. Spastic paralysis of both legs with a positive double Babinski. Impairment of sensation up to the 5th thoracic segment.

Diagnosis.—Diffuse transverse myelitis.

21st September. Very slowly improving. Can walk 50 yards with 2 sticks and can climb upstairs with difficulty—right leg still worse than left.

May 1937. Condition considered stationary and no further improvement to be expected.

Assam Medical Research Society.—Research on the cold weather bionomics of *A. minimus* gives the following conclusions:—

(a) *A. minimus* bred out in January and February form a sufficient nucleus of this carrier species so that by early March, when the prevailing mean temperatures conduce to the completion of the sporogony cycle to the sporozoite stage, they can be responsible for active transmission after that period.

(b) Stream breeding experiments, with appropriate laboratory controls, show that *A. minimus* does not winter in the larval stage.

(c) Due to continuous cold weather breeding, notwithstanding the low minimum temperatures experienced in Assam plains, there is maintained a constant supply of adult *A. minimus* throughout the cold weather.

(d) Studies of the wing grades, ovarian stages and gut contents of adult *A. minimus* from December to March reveal no evidence of hibernation, over-wintering or gonotrophic dissociation.

(e) The detection of blood in different stages of digestion in 96 per cent of *A. minimus* caught at regular intervals from December to March and dissected on the same day they were caught, and the observation that ovarian development continued uninterrupted in 1,122 specimens dissected 8 to 18 days after capture, where the ovarian development observed must have been dependent upon blood feeds having been taken, gives evidence that the feeding stimulus of this species is not inhibited by the minimum temperatures prevailing when suitable micro-climates are available.

(f) There is no evidence to support the view that infected or uninfected *A. minimus* adults are carried over in the hibernating or other stages from November to March to be a responsible factor in the transmission of malaria in March.

(g) On dissection of *A. minimus* the oöcyst rate which was 4.8 per cent in December was reduced to 2.0 and 2.1 per cent in January and February, but was subsequently increased to 8.6 per cent in March.

(h) On dissection of *A. minimus* the sporozoite rate was 1.8 per cent in December, 0.3 per cent in January, nil in February and was increased to 2.6 per cent in March.

(i) The main factors considered responsible for reduction in the amount of transmission of malaria during January and February when mean temperatures are below 60°F. are (a) the relatively short life of the vector species *A. minimus* and (b) the lengthened time required for the completion of the sporogony cycle.

(j) The observations and findings described indicate that anti-larval operations directed specifically against *A. minimus*, to be effective in preventing the annual March-April rise in the malaria case incidence in the plains of Assam, should be started not later than 15th January, annually.

[In addition to this there is a long section devoted to the account of the cholera research carried out under a grant from the Indian Research Fund Association. This is of great interest but is somewhat technical for general readers so it is omitted. Workers in cholera should consult the original report.—EDITOR, I. M. G.]

THE REPORT ON THE PUBLIC HEALTH ADMINISTRATION OF THE PUNJAB FOR THE YEAR 1936

Vital statistics.—The Director of Public Health has given an interesting analysis of the vital statistics for the year, but the figures give ground for serious consideration, if not anxiety. The number of births recorded was 1,099,146 with a rate of 16.9 per mille of the census population, and the number of deaths recorded was 562,292 with a rate of 24 per mille. The natural increase in population on these figures is 536,854. The birth rate is the highest yet recorded for the province and is considerably higher than the rate for the whole of India. The death rate is the lowest on record except for the year 1922 and the natural increase is also a record. If this rate is maintained, the census of 1941 is likely to show a population for the province of about 28 millions as compared with 23.5 millions in 1931, and the question that arises is how this population is to subsist without a substantial reduction in the standards of living.

Fevers.—The number of deaths recorded under this head includes the greater part of all the deaths recorded during the year. The number of deaths from fevers was 374,817 which is the lowest figure since 1928. It is clear, however, from the report that little meaning can be attached to the figure as it includes deaths from a number of diseases of widely different character. The most important single disease under this head is malaria, the incidence of which is only very approximately known, but it is believed that about one-third of the deaths from fevers are due to malaria.

Smallpox.—There were 2,613 deaths from smallpox during the year, most of the cases being children under ten years of age. It would appear from the figures for recent years quoted in the report that smallpox is now on the upgrade again after two years of comparative immunity.

Cholera.—This disease is also on the increase and 1,721 deaths were reported, 26 districts being affected.

Plague.—This disease reached the lowest level for many years and only 153 deaths were reported. The distribution of the disease was limited to a few districts, mainly submontane, and the larger towns remained free from infection.

Tuberculosis.—The extent to which this disease prevails is not known, and the report shows that the number of reported deaths does not even approximately indicate its actual prevalence. It is only in the towns that the disease is notifiable, and even there the majority of cases are never reported until death occurs, and often not then.

Leprosy.—The leprosy survey of the province was continued and has now been completed in 15 districts. Twenty-eight new leprosy clinics were opened during the year, bringing the total to 80.

Hookworm.—The survey was continued and has been completed in 15 districts and the result shows that the disease is much more prevalent than was formerly imagined. Hookworm is probably responsible for much ill-health which was formerly attributed to other diseases, particularly malaria. The four treatment units in Gurdaspur district continued to work and 78,176 persons were treated.

Urban sanitation.—The standard of sanitation in Municipal towns remains lamentably low and the number of such towns that have both a satisfactory water-supply and adequate drainage is still small.

Rural sanitation.—The report shows that considerable improvements have been made in village sanitation. Five hundred and six new wells were constructed, over 6,600 were repaired and over 4,000 hand-pumps installed. One hundred thousand new refuse pits were dug, 264,120 feet of drains laid and 824,640 square feet of roadway paved. This was done mainly by the labour or material supplied by the villagers or by money contributed by them.

Maternity and child welfare.—The central institution in the Punjab for welfare work is the Public Health School which trains the health visitors for work in the health centres throughout the province. The

health school worked successfully throughout the year and trained 13 students all of whom passed the final examination and found posts at health centres. The demand for health visitors exceeds the supply and proposals for six new centres failed because the supply was not sufficient.

Inspection of schools and school children.—The inspection of school premises is carried out by medical officers of health, who inspected 667 primary and 364 secondary schools in addition to 27 colleges and 9 European schools.

REPORT OF THE RAMAKRISHNA MISSION SEVASHRAM CHARITABLE HOSPITAL, RANGOON. FOR THE YEAR 1937

DURING the year 1937, the total number of patients treated at the Sevashram was 92,793. These patients did not belong exclusively to the city of Rangoon, a considerable number of them came from the suburbs and from some remote districts of Burma.

The number of patients admitted in the indoor department during the year under review was 3,178 males, 1,044 females and 153 children. The aggregate of the daily totals of attendance came up to 37,354 males, 7,978 females and 1,168 children, i.e., a total of 46,530. The average daily attendance was 103 males, 22 females and 3 children, i.e., a total of 128. The average period of stay in the hospital in each case was nearly 11 days. Some chronic cases had to be kept for months.

At the out-patients department the total number of attendances came up to 239,369 including men, women and children. The average daily attendance was 427 men, 133 women and 96 children, i.e., a total of 656.

Service Notes.

APPOINTMENTS AND TRANSFERS

MAJOR-GENERAL H. C. BUCKLEY, K.H.P., returned from leave and resumed charge of the duties of the Surgeon-General with the Government of Bombay, with effect from the forenoon of 7th November, 1938.

Colonel F. F. S. Smith to be Officiating A. D. M. S., Peshawar District. Dated 23rd September, 1938.

Colonel A. C. Munro to be A. D. M. S., Western Independent District. Dated 1st November, 1938.

The Secretary of State for India has appointed to the Civil Branch of the Indian Medical Service the undermentioned officers of the Service, with effect from the 1st April, 1937. They will count their seniority in civil employment from the dates noted against their names:—

Lieutenant-Colonel J. H. Smith. Dated 7th April, 1920.

Lieutenant-Colonel A. J. D'Souza, M.C. Dated 5th March, 1934.

Lieutenant-Colonel W. J. S. Ingram, M.C. Dated 13th March, 1919.

Lieutenant-Colonel R. C. Phelps. Dated 16th July, 1921.

Lieutenant-Colonel D. P. McDonald. Dated 8th December, 1934.

Lieutenant-Colonel G. C. Maitra. Dated 29th September, 1920.

Lieutenant-Colonel H. H. Barrett. Dated 16th July, 1924.

Lieutenant-Colonel S. M. A. Faruki to be Specialist in Ophthalmology, Rawalpindi District. Dated 30th September, 1938.

Lieutenant-Colonel R. Lee to be Officer Commanding, Indian Military Hospital, Jubbulpore. Dated 23rd October, 1938.

Lieutenant-Colonel R. Sweet, D.S.O., to be Officer Commanding, Indian Military Hospital, Peshawar. Dated 25th October, 1938.

Lieutenant-Colonel H. J. M. Cursetjee, D.S.O., to be Officiating Officer Commanding, Indian Military Hospital, Quetta. Dated 21st October, 1938.

On reversion to the Medical Stores Department on completion of his tenure of appointment as Assistant Director-General, Indian Medical Service (Stores), Lieutenant-Colonel W. M. Will, M.B., Ch.B., I.M.S., assumed charge as Officer in charge, Medical Store Depot, Bombay, on the afternoon of the 31st October, 1938, relieving Major W. T. Taylor, I.M.S., on transfer to Lahore Cantonment.

Lieutenant-Colonel C. deC. Martin was appointed Civil Surgeon, Rangoon (East), vice Captain H. Min Scin, from the forenoon of the 5th November, 1938.

Lieutenant-Colonel R. V. Morrison on return from leave was appointed First Physician, Rangoon General Hospital, vice Lieutenant-Colonel C. deC. Martin, from the forenoon of the 5th November, 1938.

On return from leave Lieutenant-Colonel N. Briggs took over charge of the office of the Director of Health Services and Inspector-General of Prisons, Sind, from Lieutenant-Colonel B. Z. Shah on the afternoon of the 9th November, 1938.

Lieutenant-Colonel J. S. S. Martin to be Officer Commanding, Indian Military Hospital, Meerut. Dated 9th November, 1938.

Lieutenant-Colonel S. L. Bhatia, M.C., returned from leave and resumed charge of the duties of the Principal, Grant Medical College, and Superintendent, J. J. Group of Hospitals, Bombay, (with effect from the forenoon of 12th November, 1938).

Lieutenant-Colonel A. C. Craighead to be Officiating A. D. P., Southern Command, and Officer in charge, Southern Command Laboratory, Poona. Dated 15th November, 1938.

The Secretary of State for India has appointed to the Civil Branch of the Indian Medical Service the undermentioned officers of the Service, with effect from the 1st April, 1937. They will count their seniority in civil employment from the dates noted against their names:—

Major V. S. R. Pandit. Dated 29th June, 1934.

Major C. H. Fraser. Dated 31st December, 1932.

Major P. A. C. Davenport. Dated 16th February, 1932.

Major R. McRobert. Dated 29th January, 1932.

Major G. J. Smith. Dated 2nd November, 1936.

Major T. J. Davidson. Dated 14th July, 1933.

Major C. A. Bozman. Dated 13th March, 1935.

On return from leave Major R. A. Wesson has been posted as Civil Surgeon, Gorakhpur.

Major A. N. Duggal to be D. A. D. P., Waziristan District. Dated 6th October, 1938.

Major D. C. Chopra joined the Indian Military Hospital, Alipore, for duty, on return from China, on the 12th October, 1938.

On completion of his term of office at Dalhousie, Major P. C. Dutta assumed charge of the office of the Civil Surgeon, Gujrat, on the forenoon of the 27th October, 1938.

Major M. K. Kelavkar, M.B.E., Officer in charge, Medical Store Depot, Lahore Cantonment, on transfer to New Delhi with a view to his appointment as Assistant Director-General, Indian Medical Service (Stores), made over charge of that Depot to First Class Military Assistant Surgeon E. Duckworth, M.B.E., on the afternoon of the 20th October, 1938.

Major M. K. Kelavkar, M.B.E., was transferred to civil employment for duty as Assistant Director-General, Indian Medical Service (Stores), on the afternoon of the 20th October, 1938.

On completion of his term of duty at Murree, Major B. Temple Raston assumed charge of the office of Civil Surgeon, Attock District, Campbellpur, on the forenoon of the 1st November, 1938.

Major L. F. Burns to be Staff Captain (Medical), Western Independent District. Dated 1st November, 1938.

On transfer from Bombay, Major W. T. Taylor assumed charge as Officer in charge, Medical Store Depot, Lahore Cantonment, on the forenoon of the 4th November, 1938, relieving Assistant Surgeon E. Duckworth, M.B.E., of the additional charge.

On his return from leave Major H. S. Waters has been re-appointed as Presidency Surgeon, Bombay, with attached duties, with effect from the forenoon of 4th November, 1938, *vice* Captain A. A. Pullar, transferred.

Major W. F. Cooper was transferred to civil employment under the Port Health Officer, Bombay, on the 9th November, 1938.

Major B. D. Khurana to be Officiating D. A. D. H., Rawalpindi and Waziristan Districts. Dated 15th November, 1938.

Major E. A. R. Ardesir was transferred to civil employment in Bengal on the 26th November, 1938.

The Secretary of State for India has appointed to the Civil Branch of the Indian Medical Service the undermentioned officers of the Service, with effect from the 1st April, 1937. They will count their seniority in civil employment from the dates noted against their names:—

Captain C. F. J. Cropper. Dated 19th June, 1935.

Captain W. McAdam. Dated 4th August, 1934.

Captain A. E. Kingston. Dated 17th November, 1936.

Captain R. L. Raymond. Dated 11th November, 1936.

Captain D. K. Lindsay. Dated 17th December, 1935.

Captain M. S. Purvis. Dated 21st November, 1936.

Captain C. C. Kapila. Dated 3rd June, 1936.

Captain H. Min Sein was placed on special duty attached to the Pathology Department at the Rangoon General Hospital to enquire into the system of indigenous drugs in Burma.

Captain P. B. Cusack to be Officiating Officer in charge, Brigade Laboratory, Abbottabad. Dated 1st October, 1938.

Captain T. P. Mulcahy to be Officiating Specialist in Gynaecology and Obstetrics, Meerut District. Dated 9th October, 1938.

On return from combined leave granted by Headquarters, Army in Burma, Captain J. D. Murdoch joined the Indian Military Hospital, Quetta, for duty on the 11th October, 1938.

Captain H. T. McWilliams to be Staff Captain (Medical), Western Independent District. Dated 1st November, 1938.

Captain M. G. Leane departed from the C. I. M. H., Loralai, for duty, with the Army in Burma, on the 11th October, 1938.

Captain J. W. Bowden was transferred to civil employment in Orissa on the 11th October, 1938.

Captain A. K. Dev to be Specialist in Surgery, Deccan District, Jabulpore. Dated 21st October, 1938.

Captain R. D. Scriven embarked from Calcutta for a tour of service in China on the 3rd November, 1938.

Captain J. H. Walters to be Staff Surgeon, Poona. Dated 7th November, 1938.

Captain S. A. Mian to be Surgical Specialist, Waziristan District, Bannu. Dated 7th November, 1938.

Captain A. A. Pullar has been appointed to officiate as Civil Surgeon, Belgaum, with attached duties, with effect from the forenoon of 11th November, 1938.

On transfer from the Military Department Captain F. V. Stonham assumed charge of the office of the Civil Surgeon, Dera Gazi Khan, on the forenoon of the 21st November, 1938.

Reverted from civil employment

Captain C. J. H. Brink, Residency Surgeon, Kashmir, on the 27th November, 1938.

Captain W. V. Stiver from Bihar, on the afternoon of the 12th November, 1938.

Captain S. M. Kharegat joined the Indian Military Hospital, Poona, for duty, on return from China, on the 28th November, 1938.

Lieutenant (on probation) C. W. Greene is restored to the Establishment from 1st January, 1938, with seniority, 1st January, 1937. (Substituted for the previous notification.)

To be Lieutenants (on probation)

1st September, 1938

Malcolm Duncan Black, with seniority 1st March, 1937.

George John Haley Maud, with seniority 1st March, 1937.

Ian Donald Sutherland, with seniority 1st March, 1937.

John James Woodward, with seniority 1st September, 1937.

Sydney Hayden Heard, with seniority 1st September, 1937.

Charles Graham Riley, with seniority 1st September, 1937.

Herbert Richard Loughran, with seniority 17th October, 1937.

Donald James Patrick Spillane, with seniority 18th January, 1938.

Patrick Murdoch Kirkwood, with seniority 12th February, 1938.

James Andrew Anderson.

John Alexander Munro Cameron.

Leonard Henry Cooper.

Douglas Spencer Wilson.

Peter John Wormald.

William Stanley Hacon.

The undermentioned officers are restored to the Establishment:—

Lieutenant (on probation) J. E. Ennis, 1st September, 1938, with seniority 1st September, 1937. (In substitution of the previous notification in the *Gazette* of the 16th September, 1938.)

Lieutenant (on probation) J. M. M. Drew, 15th October, 1938.

The following officers arrived in India on first appointment on the dates shown opposite their names:—

Lieutenant N. D. Jekyll. Dated 28th September, 1938.

Lieutenant G. A. Graham. Dated 28th September, 1938.

Lieutenant D. McC. Black. Dated 28th September, 1938.

Lieutenant J. H. Briscoe-Smith. Dated 28th September, 1938.

Lieutenant A. C. Glendinning. Dated 28th September, 1938.

Lieutenant J. G. Fife. Dated 28th September, 1938.

Lieutenant G. C. Retz. Dated 12th October, 1938.

Lieutenant R. D. D. Birdwood. Dated 12th October, 1938.

Lieutenant A. R. Woodforde. Dated 12th October, 1938.

To be Lieutenants (on probation)

1st November, 1938

E. J. Somarset, with seniority 1st May, 1937.

L. D. B. Frost, with seniority 1st May, 1937.

A. M. Mackenzie, with seniority 1st May, 1937.

J. L. M. Whitbread, with seniority 1st November, 1937.

G. T. Hayes.

O. T. Mansfield.

J. P. O'Riordan.

R. N. Houlding.

Lieutenant J. W. Lillico arrived in India, on first appointment, on the 26th November, 1938.

LEAVE

On relief by Major-General H. C. Buckley, K.H.P., Lieutenant-Colonel M. J. Holgate, O.B.E., has been granted leave on average pay for 6 months, with effect from the forenoon of 7th November, 1938.

Lieutenant-Colonel H. S. Cormack was granted an extension of 20 months' leave preparatory to retirement.

PROMOTION

Lieutenant-Colonel to be Colonel

D. F. Murphy, M.C. Dated 16th October, 1938, with seniority from 1st January, 1934.

Major to be Lieutenant-Colonel

J. Carrey. Dated 24th October, 1938.

Captains to be Majors

W. McAdam. Dated 6th August, 1938.

T. D. Ahmad. Dated 6th October, 1938.

B. N. Khan. Dated 2nd November, 1938.

A. M. Chaudhuri. Dated 6th November, 1938.

RETIREMENTS

Lieutenant-Colonel A. N. Palit, O.B.E. Dated 4th October, 1938.

Colonel J. Scott, D.S.O., O.B.E., on account of ill health, 16th October, 1938.

Lieutenant-Colonel F. M. Kirwan. Dated 23rd October, 1938.

Lieutenant-Colonel F. Stevenson. Dated 28th October, 1938.

Lieutenant-Colonel N. B. Mehta. Dated 5th November, 1938.

Notes

EUCERINUM ANHYDRICUM FOR OINTMENTS

AN IDEAL VEHICLE

EUCERINUM ANHYDRICUM is a mixture of eucerit, which is a water-fixing alcohol of the meta-cholesterol series, isolated by Lifschutz, with pure, neutral and chemically indifferent hydrocarbons. It will keep indefinitely, has no odour, is non-irritant, and can easily take up 200-300 per cent of water or watery solutions, forming permanent and homogeneous mixtures. It is, therefore, the most suitable vehicle for fluid medicaments and for solutions of medicinal substances, such as liq. Hamamelidis, hydrogen peroxide, glycerin, etc.

Eucerinum anhydricum absorbs fatty and watery secretions of the skin with equal ease. It will even adhere to damp mucous membranes, and is, thus, the basis of ointments intended for mucosæ, such as the eyes, nose, lips, ears and vagina.

Eucerinum (*cum aqua*) is a homogeneous mixture of equal parts of eucerinum anhydricum and water. Even without the addition of any medicinal agent, it is a most excellent bland ointment. The coolness produced by the evaporation of its water-content reduces the temperature of the skin. It, therefore, affects all inflammatory lesions of the skin in the same way as a cold bandage, reducing irritation and cooling the parts. On account of its fat content it softens roughened skin, and, just like Nivea creme, has a wide field of application for this purpose.

Eucerinum (*cum aqua*), on account of its even mixture of fatty and watery constituents, is absorbed into the skin without any difficulty. As was first pointed out by Unna, when treating cases of rosacea, eucerinum (*cum aqua*) forms a most excellent means of cleaning the facial skin in cases where soap and even water are harmful. As eucerinum has a composition very much like that of the skin secretions themselves, it is very easily absorbed by the skin. It is, therefore, specially suitable as a basis for ointments containing insoluble, powdery medicaments, which can exert a deep effect only in this way.

'CAMPOFERRON'

BAYERS REMEDIES LIMITED, the sole importers for India, Burma and Ceylon of 'Bayer' preparations, beg to announce to the profession the introduction of 'Campoferron', a hæmationic preparation for oral use on the basis of 'Campolon', iron and copper. Owing

to its peculiar combination 'Campoferron' is indicated in all forms of hypochromic anæmia. Further, owing to its pleasant taste and good tolerability, 'Campoferron' allows prolonged administration, and is acceptable to all types of patients.

CARDIAZOL-EPHEDRINE-KNOLL

CARDIAZOL-EPHEDRINE-KNOLL is a combination of cardiazol and ephedrine, the former exerting a direct action on the vasomotor centre, the latter an excitant of the sympathetic vascular nerve-endings. The combination thus represents a remedy of central and peripheral action. Its great advantage is that the onset of action is quicker than after ephedrine alone, and the duration of action is longer than after cardiazol alone. An important point in favour of the remedy is the high degree of tolerance in all cases. The combination is marketed in the form of tablets, in liquid form (drops) and in ampoules. Since both components possess spasmolytic properties, cardiazol-ephedrine is especially indicated in bronchial asthma, but has, above all, proved of great value in status asthmaticus, in asthma of long standing, and alteration, more particularly of the right heart. In view of its excellent tolerability, oral administration of cardiazol-ephedrine over long periods may be undertaken without hesitation; in acute asthma attacks the physician will, of course, resort to subcutaneous injection. Great benefit can be derived from this central and peripheral remedy also in the treatment of circulatory insufficiency, hypotonia and collapse.

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Original Articles

CHRONIC ULCERATIVE COLITIS

By R. N. CHOPRA, C.I.E., M.A., M.D., Sc.D. (Cantab.),
F.R.C.P. (Lond.)

MBRET-COLONEL, I.M.S.

Honorary Physician to the King,

Director of the Calcutta School of Tropical Medicine
and

P. N. RAY, B.A., M.B. (Cal.), F.R.C.S. (Eng.)

Additional Surgeon, Medical College Hospitals, Calcutta

THE problem of ulcerative colitis remains unsolved; medical opinion has oscillated between the extremes of optimism and pessimism. There are some, notably Bergen (1935) and Buie (1937), who would class it among the conquered diseases, while others, Hetenyi (1935) for instance, would classify it equally emphatically among the incurable diseases. The significance of such startling divergence of authoritative opinion will be missed unless we take into consideration the geographical distribution of the disease and the changes in dietetics and habits, induced by the complexities of modern civilization. The consensus of medical opinion is more inclined to regard it in the same light as pulmonary tuberculosis; the disease can only be arrested by prolonged treatment, involving rest in bed and maintenance of mental peace. Spontaneous intermissions are not uncommon, but intercurrent infections and emotional disturbances have marked deleterious effects on the progress of the disease.

This paper is based on the study and statistical survey of 120 cases of ulcerative colitis under our care in the Medical College Hospitals and the Carmichael Hospital for Tropical Diseases. The present investigation was undertaken as a supplement to our previous work on 'Amoebiasis and Appendicitis' (Banerji, Chopra and Ray, 1936), wherein it was observed that the incidence of non-specific colitis in a small series of cases for sigmoidoscopy was as high as 43 per cent.

Definition.—Chronic ulcerative colitis may be regarded as a disease of the large intestines during the second and third decades of life with characteristic clinical and pathological features but without any specific bacteriological infection.

The effects of allergy, avitaminosis, faulty body mechanics and emotional disturbances have yet to be precisely determined. The view that, like peptic ulcer, it may be a local manifestation of a general disease has much to recommend it but requires confirmation.

Ætiology

There is still considerable confusion in the description of ulcerative colitis. From available evidence, it appears that in a variable percentage of cases no bacteriological relationship can be

established. Neither is there any unanimity of opinion regarding the ætiological factors, although it is customary to refer to various predisposing causes. We shall therefore briefly discuss the present position.

1. *Bacillary dysentery.*—Chronic ulcerative colitis has often been regarded as a sequela to bacillary dysentery. Penner (1936) is of opinion that, in the tropics, a large percentage of cases belongs to this category, while Hurst (1931) strongly advocated the use of antidysenteric serum. Our experience does not seem to confirm this view (Chopra, Hayter and Bhattacharya, 1937). It is a curious fact that children appear to be immune from ulcerative colitis, although they are known to suffer from bacillary dysentery and its usual terminal complications (Ray, 1934).

2. *Amoebic dysentery.*—*Entamoeba histolytica* has also been regarded as a causative agent, but this view has not been confirmed by laboratory and other evidence.

3. *Streptococcal infection.*—In recent years, much attention has been paid to the investigation of a possible bacterial origin of chronic ulcerative colitis. Bergen (1935) is of opinion that a diplococcus, isolated by him from ulcers of the colon, is the cause of the disease. Intravenous injections of Bergen's diplococcus in the rabbit are said to produce diarrhoea with blood and mucus, but it cannot be said that the experimental disease bears any resemblance to the chronic ulcerative colitis in man. It is, however, important to note that this disease is prone to occur in association with infections of the upper respiratory tracts, e.g., coryza, tonsillitis, recurrent pharyngitis, and sinusitis. Influenza would seem to require special mention. The incidence of streptococcal infection in ulcerative colitis has varied within wide limits in the hands of different workers. There is no doubt of a streptococcal relationship in some cases although the question has yet to be answered, whether the infection is primary or secondary. In our hands the figures are far from convincing. The empirical administration of 'Prontosil' and anti-streptococcal serum in a number of control cases has not been marked with any tangible success.

4. *Avitaminosis.*—There is little doubt that persistent deficiency of vitamin C in the diet is an important predisposing factor in the causation of recurrent hæmorrhages from the bowel in case of chronic ulceration of the colon. In a few cases we have obtained very satisfactory results with the administration of vitamin C ('Cantan', Bayer). Uniformly good results have also been reported by Hetenyi (1935). Familiarity with the beneficial effects of cod-liver oil as a local application in various kinds of ulceration led us to try it as a local instillation in ulcerative colitis. The result was a pleasant surprise. Similar results have also been reported by Spiegel (1937) and the improvement is ascribed to the presence of vitamins A and D. We cannot exclude a reference to the vitamin-B

complex. As a dietary adjunct in the treatment of ulcerative colitis, it is generally indicated and for this purpose 'marmite' has given consistently good results. In spite of accumulated evidence, it is not yet justifiable to include ulcerative colitis in the group of the 'deficiency diseases'.

5. *Allergy*.—The question of allergy cannot be dismissed without careful consideration. In about 20 per cent of cases a positive history of allergy with regard to some specific foodstuff is obtained, and here 'Torantil' (Bayer) has been found to be of use. In two cases, the remarkable history was obtained that an improvement of the colitis was invariably noticed with the appearance of eczematous patches on the body. In another case, the onset of bronchial asthma would definitely bring about an amelioration of symptoms. Chronic ulcerative colitis presents some features comparable to those of chronic eczema or neuro-dermatosis.

6. *Faulty body mechanics*.—Poor body mechanics may give rise to functional disturbances of the colon to which have been attributed a long list of ailments ranging from indigestion to neurasthenia, and from auto-intoxication to arthritis. The primary factors in the production of these symptoms are chronic passive congestion, stasis and disturbed innervation, which may be caused by the abnormal position of the internal organs always found in faulty posture (Goldthwait, Brown, Swain and Kuhn, 1937).

7. *Emotional disturbances: 'Tropical Neurasthenia'*.—It is a curious fact that exacerbations of chronic colitis are, in nearly 50 per cent of cases, associated with some previous emotional disturbances of a serious nature. The similarity of this aspect of the disease to peptic ulceration is worthy of note.

8. *Other causes*.—In a disease of unknown origin the list of probable causes cannot be easily exhausted. Intestinal parasites which are so common in tropical countries have also been blamed for more than one symptom. Irregularity of hours, unsuitable dietary, addiction to drugs, and smoking and enteritis following typhoid and other exanthems have all been regarded as possible exciting causes.

To sum up, we are constrained to state that we are unable to determine any single ætiological factor for ulcerative colitis. It is probable that many factors combine to produce devitalization of the mucous membrane of the large intestines leading to chronic ulceration.

Pathology

The pathological concept has gradually veered round to the position that the lesion is not restricted to the mucosa but involves the sub-mucosa and, in later stages, the muscular coats. Although the ulceration is usually confined to the large gut, in severe old-standing cases it may extend to the adjacent part of the ileum. The parts most involved are the rectum, sigmoid, and the cæcum. The post-mortem appearances do

not give a correct idea of the disease, because the gross changes which are found in the later stages are considerably modified by the appearance of many complications and sequelæ.

Macroscopic appearances.—The naked-eye appearances of the mucous membrane may be carefully studied with the help of the sigmoidoscope. As the sigmoidoscopic appearances are characteristic, diagnosis is not difficult and, for convenience of clinical description, the lesions may be described in several stages. It is necessary to remember that, in the old-standing cases, these different stages cannot be strictly differentiated owing to considerable overlapping of signs, resulting from recurrent exacerbations. In the *first stage*, the mucous membrane of the rectum and the sigmoid colon shows signs of hyperæmia and inflammation (plate V, figure 1). The slightest trauma during instrumentation will give rise to bleeding. In the *second stage*, the œdematous mucosa, studded with numerous greyish-yellow granules, cannot be mistaken by the trained observer (plate V, figure 2). The transverse folds of the colon lose their sharp outline and become rounded and œdematous. The greyish-yellow granules represent minute necrotic foci or areas of degeneration under the unbroken lining epithelium. In the *third stage*, the greyish granules, having broken down, give rise to minute multiple ulcers producing a moth-eaten appearance to the mucous membrane (plate V, figure 3). The bleeding is due to the oozing from these ulcers and at times may occur in alarmingly large quantities. The *healing stage* will show multiple pale ulcers, which can only be described as indolent, and scattered scars (plate V, figure 4). In the more *chronic stage*, obliteration of the rectal valves, thickening of the mucosa, the presence of multiple granular vascular polyps and narrowing of the lumen, complete a characteristic picture (plate V, figure 4). There is another group of cases, in which large chronic ulcers are found scattered, showing little sign of healing (plate V, figure 5) owing to supervention of secondary infection from the contents of the alimentary tracts.

The *active or third stage* of chronic ulcerative colitis may assume a virulent form, characterized by severe pyrexia, widespread ulceration and marked prostration. It is necessary that in such cases great care should be exercised during sigmoidoscopic examination, otherwise there is danger of severe hæmorrhage or even perforation (plate V, figure 6). The lumen of the gut becomes markedly constricted and the friability of the soft tissues increases the dangers of instrumentation.

Histological appearances.—Owing to the protracted nature of the disease and absence of mortality in the early stages materials for histological study cannot be procured easily. The obvious difficulties of biopsy require no explanation; sections of the mucosa alone are not sufficient, and section through all the coats

of the large gut is a formidable procedure which cannot be lightly undertaken. Deaths during the early stages are usually due to other intercurrent diseases and, in the later stages, to various complications and sequelæ.

At an early stage of the disease, when the mucosa is inflamed but no ulcers have yet appeared, the microscopic picture consists of dilatation of the smallest capillaries, diapedesis and minute hæmorrhages. But the histological appearance of the granular non-ulcerated mucosa is very different and significant; it presents a homogeneous area with scanty cellular elements. There are pyramidal areas under the mucosa showing degenerative changes corresponding to occlusion or thrombosis of the deeper vessels.

This picture is considerably modified when sections are made through the moth-eaten granular mucosa, which reveal multiple miliary ulcers (plate VI, figure 7). The pin-head areas of degeneration or the miliary necrotic foci ultimately break down forming the characteristic chronic ulcers. These degenerated areas consist of hyaline material and are surrounded by some round-celled infiltration and fibrous tissue, sometimes very well marked, indicating the chronicity of the lesion (plate VI, figure 8). Similar changes are also found scattered throughout the different coats of the gut. The destruction of the lining epithelium appears to be gradual while the degenerative changes continue their steady course in the surrounding connective tissue (plate VI, figure 9). It is worthy of note that even fibrosis of these degenerated areas is a very slow and, probably, an incomplete process. Endarteritis obliterans is nowhere to be seen. The histological picture appears to be a very definite and characteristic entity, such as is seen in no other ulceration of the large intestines.

Quiescent periods.—In the intervals between the acute exacerbations of colitis, there are varying periods of intermission of symptoms. It is doubtful if the ulcers are completely healed during these periods. The analogy to duodenal ulceration is very close in this respect. The sigmoidoscopic appearance consists of pock-like scars, on a pale and 'glazed' mucosa. Microscopic sections will naturally show a variable amount of submucosal fibrosis.

Ulcers due to secondary infection.—It has already been pointed out that secondary ulcers usually supervene upon the miliary moth-eaten ulcers of chronic ulcerative colitis. These are caused by the invasion of the ulcerated area by the pathogenic organisms inhabiting the lower alimentary tract. In the very chronic cases, these secondary ulcers may be very widespread, causing a great deal of fibrosis and stenosis of the lumen. During the quiescent period, they may present the characters of superficial callous ulcers, but during an acute exacerbation, they may be transformed into deep penetrating or excavating ulcers, not infrequently simulating malignancy.

Complications and sequelæ.—With each acute exacerbation, the functions of the large intestines, *viz.*, absorption of fluid and motility of peristalsis, are grossly interfered with. Owing to extension of ulceration, fibrosis of the muscular coats, and destruction of the lining epithelium, diarrhœa and mucous discharge may become intractable, making the patient a chronic invalid. Recurrent rectal hæmorrhage may endanger life and give rise to severe anæmia. The bleeding is usually bright red, but mælena is not uncommon, indicating bleeding from the cæcum and the proximal colon. Stenosis of the lumen is a constant feature of the chronic cases; when well marked the lower colon, and in particular the rectum, become converted into an unyielding narrow tube lined with chronic indolent ulcers, giving rise to purulent and hæmorrhagic discharge. The diagnosis of these cases may be very difficult. Perforation, adhesions, pericolitis and fistulæ-in-ano may be regarded as other important sequelæ.

The extent and distribution of these pathological changes vary a great deal, and in cases operated upon it was found that all the coats of the colon were involved. The lymphatic glands in the mesentery and sigmoid mesocolon are invariably enlarged and œdema of the mesocolon is also common. It has not been possible to determine yet whether this is not due to a secondary infection. It is, however, worthy of note that the lymphatic nodules of the intestines, unlike those in typhoid fever, remain fairly healthy. Capillary thrombosis, hyaline degeneration and infarction appear to be the main histological lesions, but these findings are unknown in chronic colitis associated with bacillary dysentery and gummatous ulcers. It is somewhat difficult to explain the occurrence of such extensive ulceration as being wholly due to devitalization, resulting from impaired vascular supply. Such a widespread lesion, associated with endarteritis obliterans, is not even seen in course of syphilitic ulceration of the colon. The hæmorrhage is usually caused by the ulcers, but the so-called granular 'polyps', which are masses of granulation tissue, may at times be responsible. These are comparable to the nodules seen in epidemic dropsy.

Bacteriology

In the analysis of our cases we have not been able to point to any particular organism as the exciting cause. There is no evidence to show how the infective organisms invade so large an area of the gut. Even in the earlier stages, an extensive area of the gut is involved. There is no evidence to show that the disease is liable to appear at any particular region of the colon or to spread in any particular direction. In spite of every care in the majority of cases, no growth could be obtained on culture of the scrapings of ulcers. The bacterial examination of fæces may be found of interest in this connection.

TABLE I.

Microscopical examination of fæces in 100 cases

Helminths—		
<i>Trichuris trichiura</i> eggs ..	..	3
Hookworm eggs ..	..	8
Protozoa—		
<i>Giardia</i> cysts ..	..	5
<i>Entamoeba histolytica</i> —		
Vegetative forms only ..	..	1
Cysts only ..	..	2
Vegetative forms and cysts ..	..	1
Charcot-Leyden crystals ..	..	4

As ankylostomiasis is fairly widespread in this part of the country, its coincidence with ulcerative colitis is not significant.

Amœbic dysentery is common in India. A routine examination of the fæces of patients admitted into the Carmichael Hospital for Tropical Diseases showed an incidence of 12 per cent of infections with *E. histolytica* (Chopra, 1936). In the present series the incidence is only 4 per cent. These cases were treated for amœbiasis and the stools were examined repeatedly until they were negative for the parasite. The association of Charcot-Leyden crystals with amœbiasis does not appear to be of any significance.

TABLE II

Cultural examination of fæces in 100 cases

Organisms	Present survey	Chopra, Hayter and Bhattacharya (1937)
<i>B. pseudo-carolinus</i> ..	14	20
<i>B. asiaticum</i> ..	11	5
<i>B. carolinus</i> ..	8	Nil
<i>Ps. pyocyanea</i> ..	7	5
<i>Strepto. faecalis</i> ..	4	1
<i>Bact. alkaligenes</i> ..	3	18
<i>B. pseudo-asiaticum</i> ..	3	3
<i>B. morgani</i> ..	2	5
<i>B. meta-alkaligenes</i> ..	2	1
<i>B. flexner</i> ..	2	Nil
<i>B. shiga</i> ..	1	Nil
Monilia ..	1	Nil

The incidence of bacillary dysentery was only 3 per cent and it compares very favourably with that of amœbiasis. The non-dysenteric character of chronic ulcerative colitis is therefore clearly indicated. *Streptococcus faecalis* was isolated in only 4 per cent of cases. We have included *Ps. pyocyanea*, *Bact. morgani*, *B. carolinus* and *B. meta-alkaligenes* in this investigation because there are good reasons for believing that they might cause intestinal disorder.

Scrapings from the ulcers of the rectum and sigmoid showed the presence of Gram-positive cocci on three occasions. Other organisms isolated were a Gram-positive spore-bearer, staphylococci, a Gram-positive bacillus, a Gram-negative bacillus, and diphtheroids on one occasion each; these findings indicate the non-specific character of these ulcers.

It would appear to be extraordinary that no better information could be obtained by careful examination and culture of the scrapings of these ulcers. It may be objected that the infection is deep seated and therefore no further information could be obtained from the scrapings of comparatively superficial tissues from the floor of the ulcers.

Culture of blood.—It was hoped that by adopting special measures a conclusive result might be obtained, but a positive bacterial finding was an exception rather than the general rule, and in only two out of twenty cases spore-bearing organisms were isolated after forty-eight hours. No pathogenic organisms were isolated.

Investigations and diagnosis

Cases of ulcerative colitis are generally treated as dysentery before any surgical advice is sought, consequently the early stage, which is the best for chances of recovery, is seldom seen by the surgeon. Much valuable time is usually lost by treatment for hypothetical parasitic infections. On an average we get a history of three or four years' recurrent attacks of indigestion, diarrhoea and dysentery with repeatedly negative stool reports. In these chronic cases a great deal of care and caution would be necessary because in about 26 per cent of cases there is a positive history of bacillary or amœbic dysentery within a period of five years. The sigmoidoscopic examination is usually conclusive for diagnosis and it may be stated as a general rule that the rectum and the sigmoid are never free from the characteristic ulceration. In each case, provided there is no bleeding, further information may be obtained by skiagraphy after an opaque enema.

Sigmoidoscopy.—A careful digital examination is always necessary before instrumentation. Much valuable information is obtained with regard to the condition of the sphincters, the calibre of the lumen, and degree of severity of pain. No violence is permissible and it is always important to keep in mind the friability of the mucosa, owing to its inflamed condition and its liability to hæmorrhage. No local anæsthesia is generally necessary and no special preparation other than a saline enema on the previous night is called for. A sigmoidoscope with a smaller calibre is preferable as in the majority of cases there is some narrowing of the lumen.

TABLE III

Analysis of sigmoidoscopy

Lesions	Percentage
Mucosal thickening and congestion ..	17
Miliary ulcers (moth-eaten) ..	38
Large ulcers with grey base ..	6
Ulcers with gelatinous matter ..	6
Multiple minute bleeding points ..	7
Red granular polyps ..	7
Scars of healed ulcers ..	7
Narrowing of lumen: stenosis ..	6
Fissures ..	2
Fistulae ..	2

The sigmoidoscopic appearance of these ulcers and their different stages have already been described. A differential diagnosis, however, must be made from amœbic ulceration.

During the early stages of the disease, spasticity of the gut was usual; the descending colon (in 35 per cent) and the ascending colon (in 31 per cent) were almost equally involved. In 10

TABLE IV
Differentiation from amœbic ulceration

	Amœbic ulcers	Ulcerative colitis
Nodules	Over crests of transverse folds.	Miliary granules, so-called 'polyps'.
Ulcers	'Button-hole' undermined and shaggy.	Pin-head and pock-like moth-eaten appearance.
Scars	Oval or rounded central pigmentation.	Pock-like.
Rectal valves and folds	Some thickening but folds present.	Obliteration of the valves, œdema of mucosa.
Scrapings	Viscid gelatinous.	Frangible and bleeding.

Sterile swabs and culture of scrapings.—These procedures are carried out as routine measures and have already been described.

X-ray examinations and opaque enemas.—Skiagraphy should follow sigmoidoscopy; a barium meal is usually given in order to investigate the condition of the gastro-intestinal tract. From a radiological survey of our cases in this series, we find that some abnormality of the duodenal cap is present in 37 per cent, a 5-hour residue in the stomach in 28 per cent and other gastric anomalies in about 5 per cent of the total number of cases. An explanation of the gastric symptoms is thus readily obtained, the gastric residue is due either to pyloro-spasm or to atony. There was only one case of duodenal ulcer, the remainder came under the heading of duodenitis (plate VIII, figure 10).

per cent of cases, there was hypermotility associated with diarrhœa. The descending colon appears to be more liable to stenosis with permanent narrowing of the lumen (plate VII, figure 11). Dilatation of the ascending colon was present in 18 per cent and of the descending colon in 5 per cent. A 48-hour residue was obtained in 28 per cent, representing chronic cases with ulceration and narrowing of the lumen (plate VII, figure 12). It is evident that skiagraphy will reveal the extent of the disease, site of stenosis, fixity of the gut and loss of haustration (plate VII, figure 13). Some malformation of the cœcal base is also an important feature.

Clinical features

Incidence of sex.—The percentage ratio between males and females was 72 : 28.

Incidence of age.—Chronic ulcerative colitis is chiefly a disease of the second and third decades of life.

Early stage.—The clinical features in the early stages are unfortunately not very definite and the condition is generally diagnosed as dyspepsia, 'tropical neurasthenia', chronic constipation, recurrent diarrhœa, or even dysentery. But when the signs and symptoms are well marked, diarrhœa, precipitate motions, with discharge of mucus and blood are prominent features. In spite of periodic remissions vague digestive symptoms are generally complained of. The incidence of gastric symptoms is easily explained by a reference to the tables on radiological analysis. The rarity of the presence of peptic ulceration is worthy of note. In general, abdominal cramps, rectal pain and discomfort, tenesmus and urgency may make life unbearable. Pyrexia is present at some stage or other in nearly half the cases. The pulse is an important guide to prognosis for, if it exceeds 120 per minute, it is a serious omen (Bell, 1936). In this review, we are not considering the acute type of ulcerative colitis which quickly leads to a fatal termination.

Periods of remission.—These are very variable but each succeeding attack becomes more acute than the last one and brings about severe prostration and loss of weight. Many of these cases are considered to be 'tropical neurasthenia', because the condition is frequently ushered in by serious emotional disturbances. Relapses are

TABLE V
Analysis of 120 cases of colitis: a radiological survey

Stomach—			
5-hour residue	28		
Other anomalies	5		
Duodenum abnormalities of cap ..	37		
Appendix—			
Visualized	33		
Residue	3		
Cæcum abnormalities	17		
Ptois	20		

The appendix was visualized in 33 per cent of cases while a residue was obtained in 3 per cent only. From the study of these figures it appears that gross lesions did not extend, at the earlier stages, throughout the entire length of the large gut. Abnormalities of the cæcum were present in 17 per cent.

TABLE VI
Analysis of the radiological appearance of the colon

	Spasticity	Dilatation and stasis
Ascending colon	31	18
Transverse colon	5	5
Descending colon	35	5
Hypermotility	10	..
Irregular filling	20	..
48-hour residue	28	..

common after infections of the upper respiratory tract.

Intestinal hæmorrhage.—The incidence of hæmorrhage is also variable. In one attack it may be alarming and in the succeeding ones there may be no bleeding at all. The blood may be bright red and may come with frequent discharge of mucus, but melæna is not uncommon when the cæcum and the proximal part of the colon are involved.

Clinical types.—It is not always possible to divide chronic ulcerative colitis into clinical types but it would be of some practical use to consider them as belonging to one or other of the following groups: (i) infective, (ii) allergic, (iii) avitaminotic, and (iv) neurasthenic. These will be referred to in the next section.

Treatment

It has to be admitted that there is no specific for this condition; the treatment is generally protracted and somewhat onerous, a careful dietetic regime having to be maintained.

I. *General and medical treatment.*—As early cases are seldom seen by the surgeon, only chronic and moderately serious cases are included under this group. The time of strenuous treatment is at the early stages before the colon is converted into a physiologically inefficient organ owing to fibrosis and stenosis (Goodall, 1936).

1. *Rest in bed.*—This is very important for maintenance of strength and control of fever. Exercise or activity usually increases the tenesmus and frequency of motions. *Postural treatment.* In the more serious cases, frequency of motions is distressingly increased even by the erect posture alone. Appreciable relief is quickly obtained by beginning the treatment in the recumbent position. In this position the force of gravity, which increases the sag of the organs and the strain on the body as a whole when in the upright posture, is practically eliminated. For this purpose both the 'hyperextension position' with dorsal decubitus and pillows under the knees, and 'the face prone' position are recommended.

2. *Diet.*—By general consensus of opinion a low-residue diet is best, but it is important to remember two fundamental desiderata. Firstly, the diet should be made up of adequate calories for maintenance of good health and body-weight, and, secondly, it must contain the necessary vitamins. Many patients go down hill because the diet is too restricted and monotonous. In a case of moderate severity it is best to begin with a modified Sippy treatment with addition of Benger's food and suitable extractives. A more generous diet may be quickly allowed, provided there is no bleeding or abdominal cramps.

3. *Administration of vitamins.*—There is reason to believe that avitaminosis is an important factor in the ætiology of this disease. (i) Ascorbic acid (vitamin C) has an excellent styptic effect in hæmorrhages of ulcerative colitis.

It is given in the form of 'Cantan' (Bayer) either intravenously or intramuscularly in daily doses of 150 mgm., until there is only one motion free from blood and pus (Hetenyi, 1935). In less urgent cases the drug may be given orally, the usual dose being one tablet three times daily. (ii) *Vitamin-B complex.* It is as yet difficult to indicate the precise effect of vitamin-B complex on ulcerative colitis. In the form of 'marmite' it has been found to be a valuable adjunct in the treatment of this disease. (iii) *Vitamins A and D.* We cannot say that cod-liver oil by mouth has been beneficial but rectal instillation has been attended with gratifying results and will be referred to again.

4. *Treatment of allergy.*—There is little doubt that in a number of cases a definite history of allergy is obtained, but it is not possible to state at present whether the allergy is due to a particular protein or some unknown amino-acids as the result of incomplete digestion. In this group 'Torantil' (Bayer) is worthy of trial as very gratifying results are not infrequently obtained. One ampoule of 'Torantil' is injected intramuscularly twice a week; one course comprises five injections. This is followed by a course of oral treatment consisting of one pellet before each principal meal for one week. The patient should be watched carefully as in some cases, which are impossible to predict, the symptoms may be definitely aggravated. In one case, after the ingestion of two pellets, serious bleeding was definitely stopped.

5. *Mental tranquillity.*—The restoration of mental peace after serious emotional disturbance is not easily achieved. In these cases it may be necessary to administer sedatives. Elimination of mental worries tends to rapid improvement in one group of cases which may be called the neurasthenic type. Vitamin-B complex is usually beneficial in this type of case. Psychotherapy may be needed in a serious case of nervous breakdown and severe mental depression.

6. *Vaccines and sera.*—Bargen (1935) and Buie (1937) report excellent results with auto-vaccines and specially prepared sera, but we have not been very fortunate in our results. 'Pron-tosil' (Bayer), which has been so successful in our hands (Ray, Alam and Ghose, 1938) in

EXPLANATION OF PLATE V

Fig. 1.—The mucous membrane of the rectum and the sigmoid colon shows signs of hyperæmia and inflammation (first stage).

Fig. 2.—The oedematous mucosa is studded with numerous greyish-yellow granules (second stage).

Fig. 3.—Showing minute multiple ulcers; 'moth-eaten appearance', old scars and a small vascular polyp (third stage).

Fig. 4.—Showing multiple pale ulcers and some granulating ulcers with marked tendency to bleeding (healing stage).

Fig. 5.—Showing a large chronic ulcer, with little sign of healing, owing to supervention of secondary infection.

Fig. 6.—Showing a very acute type of ulceration.

PLATE V



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.

PLATE VI



Fig. 7—Section through one of the primary ulcers of 'the moth-eaten granular mucosa' showing thrombosis of deeper vessels, scattered hyaline degeneration and fibrosis.



Fig 8—Photomicrograph through an area of degeneration containing hyaline substance, surrounded by well-marked fibrosis (Zeiss 1/6 X 2)

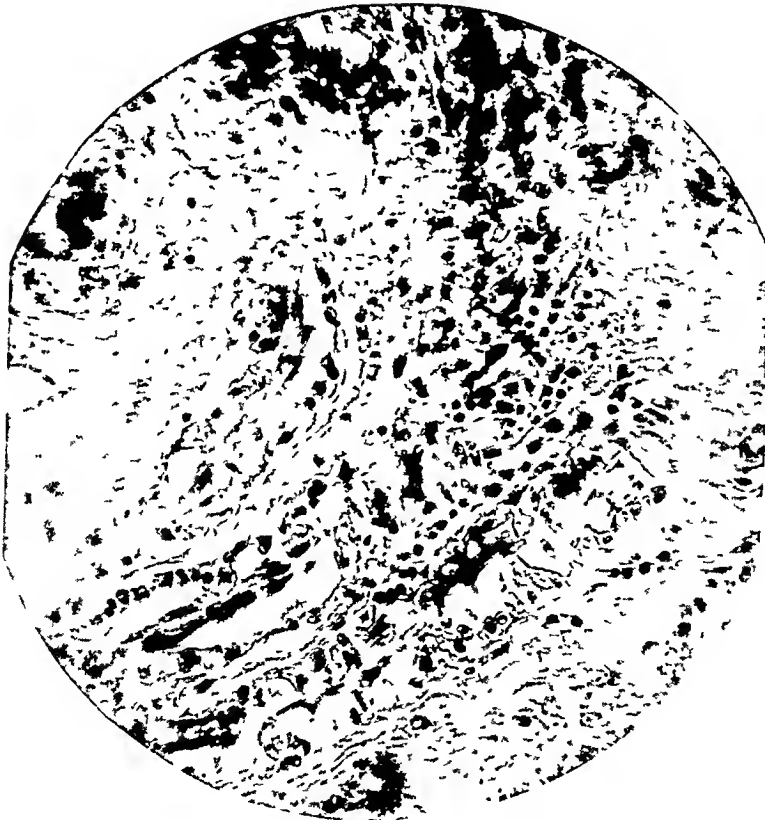


Fig. 9.—Photomicrograph Section through the mucosa, showing degenerative changes around the glandular acini. (Zeiss 1/6 X 2)

PLATE VII



Fig. 11.—Showing poor haustration of the descending colon.



Fig. 12.—Showing 48 hours' residue in the transverse colon.



Fig 13.—Note the 'string sign' of colitis, descending colon
Caecum has emptied rapidly, leaving flakes behind.

PLATE VIII



Fig. 10.—Showing some deformity of the duodenal cap.
Suspected duodenitis.

Aberrant Pancreatic Tissue in the Alimentary Tract:
Lieut.-Col. M. M. Cruickshank.



Fig. 1.



Fig. 2.

Sections of tumour removed from jejunum.

various streptococcal infections, does not seem to be efficacious; neither have anti-streptococcal sera of reputable makes proved of any greater value. Auto-vaccines in a few cases have been beneficial, affording some amelioration of symptoms.

7. *Drugs*.—There are no specific drugs, but a few need mention for purposes of symptomatic treatment:—

(i) *Buffered citrate therapy* (Montague, 1934). Success has been claimed with this method of treatment and it is ascribed to an improvement of acid-base balance of blood, lessened tendency to alimentary capillary stasis and venous thrombosis, and improved tissue resistance to general infection. Schultz's solution is used for intravenous injection. It consists of a combination of sodium citrate and sodium chloride buffered with a salt which raises the concentration of the solution somewhat higher than that of normal blood. The initial dose consists of 10 c.cm. This is doubled after 24 hours and continued on alternate days.

(ii) *Lactose*.—It is probably not quite correct to include lactose among the drugs, but it is particularly valuable in cases where flatulence and intestinal fermentation are troublesome, and it may be used in place of sugar and glucose. In chronic constipation, it is useful as a mild laxative.

(iii) *Plantago ovata*.—It is known in the vernacular as 'ispaghula' or 'isabgul' and is a well-known and popular remedy in chronic dysentery, on account of its emollient and demulcent effect. The seeds are thoroughly cleaned free from sand and grit with which they are mixed. Two to four heaped dessertspoonfuls are mixed with a little sugar and shaken up in a cupful of water and the mixture is then swallowed. The drug has no bactericidal action and its effect appears to be entirely mechanical. The seeds after ingestion become uniformly mixed with the intestinal contents so that they are spread uniformly over the entire surface of the mucous membrane. The irritated or ulcerated areas of the intestinal mucosa are soothed by the demulcent action of the mucilage, which is not acted upon by the intestinal juices. It thus covers the surface of these ulcers protecting them from further irritation. The drug is tasteless and in chronic constipation it produces a laxative action similar to that of agar (Chopra, 1936).

(iv) *Kaolin*.—Kaolin has been used for its adsorptive effect on the bacteria and their toxins and for the production of formed stools where looseness of the bowel is a predominant symptom. In a severe case of ulcerative colitis the entire colon, as a result of chronic inflammation and destruction of the epithelium, has lost so much of its absorptive power that very large amounts of the drug would be required, endangering the removal of necessary vitamins by adsorption. It, therefore, seems probable that

the potential dangers offset the potential value of this medication (Emery, 1937).

(v) *Opiates*.—In spite of the introduction of numerous substitution products it is doubtful if the action of opium can ever be excelled by any other drug for the induction of sleep, control of diarrhoea and increased frequency of motions, and the relief of abdominal pain. Tincture of opium in five to ten minim doses is invaluable for prompt relief. Compound tincture of camphor, in one drachm doses, is also useful. It is important, however, to discontinue the drug as soon as the desired therapeutic effects have been obtained.

(vi) *Maintenance of water balance*.—In cases of diarrhoea and vomiting it is imperative to maintain an adequate water balance, and for this purpose, when necessary, solutions of glucose (25 c.cm. of 25 per cent solution) should be administered intravenously, and normal saline solution subcutaneously.

(vii) *Calcium and parathyroid*.—Prolonged administration of calcium lactate (5 grains) and parathyroid extract (1/20 grain) appears to be beneficial in a number of cases.

II. *Local and surgical treatment*.—Surgical measures may have to be undertaken for palliation of symptoms or treatment of complications.

(i) *Transfusion of blood*.—A high degree of anaemia is not infrequent in ulcerative colitis and is due to continuous loss of small quantities of blood in the faeces. In these cases a small transfusion (200 c.cm.) twice weekly for three or four weeks may be carried out with benefit. On rare occasions transfusion of blood may be necessary as a life-saving measure. With neo-haemoplastin (Parke, Davis and Co.) excellent results are generally obtained, but failures are not infrequent, whereas repeated transfusions of blood may be successful. In massive hæmorrhage morphine is indispensable as in duodenal hæmorrhage.

(ii) *Medicated enemata*.—Since the disease affects all the coats of the large gut, the use of medicated enemata may be rightly regarded as illogical. Stronger antiseptics cannot possibly reach the deep-seated diseased areas and, on the contrary, may aggravate the patient's condition by further devitalizing the superficial ulcers and lead to delay in healing. Nothing can supersede a normal saline enema in these cases. Local instillation of cod-liver oil has been found to be beneficial. It was first tried by us empirically, as we were impressed with its encouraging results in some intractable ulcers of the skin. At first half an ounce of cod-liver oil was injected at night slowly with a rubber catheter, but in the majority of cases it was promptly rejected. In about a week's time retention of the oil was found to be fairly satisfactory. A better method consists of giving a 40 per cent emulsion of cod-liver oil with gum acacia. The emulsion is instilled two to four times a day in doses of two to four ounces with a gradual increase up to eight ounces (Spiegel, 1937). Marked improvement

is not usually noticed before three months. A 60 per cent suppository of cod-liver oil may also be used. The vitamin treatment, when successful, produces a brilliant result.

(iii) *Operative procedures.*—The object of the usual operative procedures is to give rest to the diseased parts by diverting the faeces through an artificial anus.

(a) *Appendicostomy.*—Although this operation is still recommended by many for the purpose of lavage, the result, in our opinion, can only be described as unsatisfactory.

(b) *Cæcostomy.*—This operation was performed with much greater enthusiasm in the past with the laudable object of short-circuiting the faecal contents and for providing prolonged rest to the diseased colon. The results do not, however, justify this operation. When the colon is extensively diseased, after a prolonged period of rest it is converted into such a mass of fibrosis that functionally it becomes useless and the cæcostomy remains as a permanent token of futile surgical interference.

(c) *Left colostomy.*—This may have to be performed either as a life-saving measure in case of intestinal obstruction associated with rectal stricture or as a palliative measure for extensive fistulae and pelvic cellulitis. Unfortunately this may remain a permanent artificial anus.

(d) *Ileostomy.*—In the past ileostomy was advocated as a temporizing measure instead of colostomy, but usually the patient succumbed soon after (Lardennois, 1936).

(e) *Short-circuiting operations.*—Theoretically anastomosis between the ileum and the lower colon has been advocated, with or without excision of the remaining part of the large intestine. This operation is not a practical proposition for the simple reason that the rectum and the sigmoid are the parts which suffer most. Besides, few patients would be able to survive the severity of such a major operation.

(f) *Surgery of complications.*—Of the complications most commonly complained of, fistula-in-ano, fissure, and so-called 'piles' need mention. The golden rule is not to interfere unless there is some definite indication.

Results of operative treatment.—The results of operative treatment have been uniformly unsatisfactory; moreover, the simplest surgical interference entails a high rate of mortality (25 to 40 per cent). Unfortunately, the formation of an artificial anus is indicated in the neglected cases complicated by stenosis of the rectum or the sigmoid colon, perineal cellulitis or multiple fistulae. Of the rare complications which require operative treatment, may be mentioned intestinal obstruction and perforation which are, however, usually attended with a fatal result.

Prognosis

At best, the prognosis is, if anything, better than in the past. In about 50 per cent of cases definite improvement takes place but the treatment must be prolonged and laborious. It is yet too early to say if recurrence can be prevented.

In the more chronic cases, even if the ulcers are healed, proneness to diarrhoea and mucous discharge tends to persist owing to gross damage to an extensive area of the large intestine and consequent impairment of its physiological function of absorption of fluid. Some peristaltic disturbance persists also owing either to the mechanical cause of widespread fibrosis or impairment of the neuro-muscular mechanism.

Summary

This review of chronic ulcerative colitis is based on the clinical study of 120 cases with special reference to diagnosis, pathological findings, radiological analysis and treatment.

1. Chronic ulcerative colitis may be regarded as a disease of the large intestines during the second and third decades of life with characteristic clinical and pathological features but without any specific bacteriological infection.

2. It has not been possible to determine any single aetiological factor for ulcerative colitis. It is possible that many factors combine to produce devitalization of the mucous membrane of the large intestine leading to chronic ulceration.

3. Of the aetiological factors, avitaminosis, allergy, faulty body mechanics, emotional disturbances, streptococcal infection, and dysentery require special consideration.

4. In diagnosis, the sigmoidoscopic appearances are usually conclusive. In early cases, several stages may be described for convenience. In the *first stage*, the mucous membrane of the rectum and the sigmoid shows signs of hyperaemia and inflammation. In the *second stage*, the cedematous mucosa is studded with greyish-yellow granules representing minute necrotic foci. In the *third or active stage* there is the typical moth-eaten appearance owing to the breaking down of these granules. The *healing stage* presents multiple indolent ulcers and scars, while in the more chronic stage multiple vascular granular polyps are seldom absent. In another group of cases, large chronic ulcers are found, which show little sign of healing owing to superinfection of secondary infection.

5. At an early stage, when no ulcers are present, the microscopic picture consists of capillary dilatation, diapedesis, and hæmorrhage. The granular stage corresponds to minute necrotic foci under the mucous membrane with occlusion or thrombosis of the deeper vessels. Multiple small ulcers are next seen in the moth-eaten granular mucosa. Within the deeper tissues there are scattered necrotic areas containing hyaline-like material in various stages of fibrosis.

6. In the analysis of our cases we have not been able to point to any particular organism as the exciting cause. The bacterial examination of faeces showed an incidence of only 4 per cent for *E. histolytica* and 3 per cent for bacillary dysentery. The non-dysenteric character of chronic ulcerative colitis is therefore clearly indicated. *Streptococcus faecalis* was isolated in only 4 per cent of cases. We have included

Ps. pyocyanea, *Bact. morgani*, *B. carolinus* and *B. meta-alkaligenes* in this investigation, because they appear to be incriminatory. The analysis of scrapings of ulcers of the rectum and the sigmoid also point to the non-specific character of these ulcers. Culture of blood was found to be uniformly negative.

7. From a radiological survey of our cases in this series some abnormality of the duodenal cap was present in 37 per cent, a 5-hour residue in the stomach in 28 per cent and other gastric anomalies in 5 per cent. The gastric residue is due either to pylorospasm or to atony. There was only one case of duodenal ulcer, the remainder came under the heading of duodenitis. The appendix was visualized in 33 per cent but a residue was obtained in only 3 per cent. Abnormalities of the caecum were present in 17 per cent. At an early stage of the disease spasticity of the gut was usual; the descending colon (35 per cent) and the ascending colon (31 per cent) were almost equally involved. Hypermotility was seen in 10 per cent and was associated with diarrhoea. The lower gut appears to be more liable to stenosis, while dilatation of the ascending colon was present in 18 per cent and of the descending colon in 5 per cent. A 48-hour residue was obtained in 28 per cent, representing chronic cases with ulceration and narrowing of the lumen.

8. The percentage ratio between males and females was found to be 72 : 28. The signs and symptoms in the early stage are not very definite, but when well marked, diarrhoea, precipitate motions, discharge of blood and mucus are prominent features. The periods of remission are very variable, but each succeeding attack becomes more acute than the last one and brings about severe prostration and loss of weight. Clinically, four types may be differentiated, viz, (i) infective, (ii) allergic, (iii) associated with avitaminosis, and (iv) neurasthenic.

9. There is no specific for this condition and treatment is generally protracted. A somewhat onerous and careful dietetic regime has to be maintained. Rest in bed with postural treatment is always important for maintenance of strength, control of fever and diminution of tenesmus and frequency of motions. A low-residue diet is recommended, but it must be made up of adequate calories and it must contain the necessary vitamins. Ascorbic acid (vitamin C) has an excellent styptic effect in rectal hæmorrhage. Vitamin-B complex has a beneficial effect, but it is as yet difficult to indicate the rôle it plays. There is little doubt that allergy, when present, is due to a particular protein or some unknown amino-acid resulting from incomplete digestion. In this group of cases 'Torantil' (Bayer) is worthy of trial. Elimination of mental worries is an important factor in recovery. Vaccines and sera do not appear to have any definite effect. Of the drugs, lactose and *Plantago ovata* (isabgul) are useful. Buffered citrate therapy and kaolin have also

their advocates. In spite of the introduction of numerous substitution products, it is doubtful if the action of opium can ever be excelled by any other drug for the induction of sleep, control of diarrhoea, and relief of abdominal pain in a really severe case.

10. Surgical measures may have to be undertaken for palliation of symptoms and complications. Transfusion of blood may be required either for severe anaemia or as a life-saving measure. Medicated enemata do not appear to be useful because the disease affects all the coats of the large gut. Rectal instillation of cod-liver oil or emulsion has been found to be beneficial. The object of the usual operative procedures is to give rest to the diseased parts by diverting the faeces through an artificial anus. Operative measures, such as appendicostomy, ileostomy and short-circuiting operations, are now seldom resorted to. Of the complications most commonly complained of, fistula-in-ano, fissure and so-called 'piles' need mention. The golden rule is not to interfere in these cases unless there is a definite indication.

11. At best the prognosis is, if anything, better than before. In about 50 per cent of cases definite improvement takes place with clinical cure but the treatment must be prolonged and laborious. It is yet too early to say if recurrence can be prevented. In the more chronic cases, even if the ulcers are healed, proneness to diarrhoea and mucous discharge tends to persist, owing to gross damage to an extensive area of the large gut, with consequent impairment of its physiological function of absorption of fluid and peristalsis.

Acknowledgments

In conclusion, we wish to acknowledge our indebtedness to our many colleagues for their valuable help. To Major C. L. Pasricha, I.M.S., our best thanks are due for the pertinent laboratory data, and to Lieut.-Col. J. A. Shorten, I.M.S. (retd.), we are indebted for the skiagraphy. We also wish to acknowledge our indebtedness to Prof. C. C. Bose and Dr. D. N. Bannerji, M.D. (Berlin), of the Carmichael Medical College and their colleagues for the pathological investigation. Our best thanks are also due to our house staffs and, in particular, to Dr. M. P. Talukdar, registrar of the Carmichael Hospital for Tropical Diseases.

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ABERRANT PANCREATIC TISSUE IN THE ALIMENTARY TRACT

By M. M. CRUICKSHANK

LIEUTENANT-COLONEL, I.M.S.

Madras

THOUGH the presence of pancreatic tissue in the alimentary tract is still considered an infrequent anomaly, yet over 350 cases have been reported in the literature, since Klob in 1859 reported the first case. Of the heterotopias found in the alimentary tract the accessory pancreas is the commonest.

The most common sites are the stomach and duodenum and the most frequent pre-operative diagnosis is either gastric or duodenal ulcer. This is what is to be expected, when one considers the development of the pancreas.

'It is probable that accessory pancreatic tissue is formed from lateral budding of the rudimentary pancreatic ducts as they penetrate the intestinal wall, the mass of pancreatic tissue thus formed being snared off and carried by the longitudinal growth of the intestine either upward or downward' (Warthin). That such irregular budding does occur is evidenced by the finding of such buds in close proximity to the duodenal papillæ, especially the lesser.

Similarly, the presence of pancreatic buds in the gall bladder is explained by the lengthening of the common bile duct, as the gall bladder developed.

On the other hand, acquired heterotopias do occur, in the same way as epithelial heterotopias of the alimentary tract arise during the healing process which follows a chronic inflammatory lesion, where ulceration and loss of tissue have occurred. As an example of this, one may cite

those instances where the healing epithelium of the stomach takes on the morphological features of small gut.

The significance or importance of the presence of aberrant pancreatic tissue lies, of course, in the frequency with which it is mistaken for gastric conditions, more especially, if mistaken for neoplastic growths.

The pancreatic nodule in the gut may be the exciting cause of an intussusception; it may cause pyloric stenosis or acute intestinal obstruction; it may be the seat of an acute or chronic inflammation or of a carcinoma.

Pathologically two types are described, the aberrant pancreatic nodule and the annular pancreas.

The former is a much more common type and is the form which gives rise to difficulties in diagnosis and in many instances goes unrecognized until encountered during the course of some abdominal operation.

The rarer annular pancreas encircles the second portion of the duodenum and gives rise to constriction of that portion.

This form has definite clinical importance in that it may give rise to all the signs and symptoms of high intestinal obstruction. Whereas the nodular type is discovered usually at operation, the annular type, unfortunately, is usually a post-mortem finding.

The relation of carcinoid tumours of the appendix and small intestine to pancreatic rests has been a subject for much discussion. Some pathologists have stated that both adenomyomas and carcinoids arise in pancreatic rests and that carcinoids were pancreatic rests in which only the islet cells of Langerhans appeared. Masson and others have, however, shown that no such relationship exists and that carcinoids arise from chromaffin or argentaffin cells in the crypts of Lieberkühn. Moreover, carcinoids are found most frequently in the appendix, while pancreatic tissue has never apparently been found in the large bowel.

Report of a case

A Hindu, male, aged 25 years, was admitted into hospital, complaining of pain in the upper region of the abdomen, which had lasted off and on for over two years.

Family history.—Nothing relevant.

Previous illnesses.—Nothing relevant.

History of present illness.—Has suffered from attacks of epigastric pain for two years. These attacks last anything from three to ten days and are followed by free intervals varying from four to eight weeks, but latterly the intervals have shortened to one week. The pain comes on about half an hour after taking food and lasts for about three to four weeks. The pain is relieved by vomiting which is spontaneous, but is on occasions induced. The vomit has occasionally been streaked with blood and the patient has, so he states, passed dark tarry-looking motions. Appetite has

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THE HEART IN ANÆMIA

By GEORGE R. McROBERT, M.D.

LIEUTENANT-COLONEL, I.M.S.

and

D. GOVINDA REDDY, M.D.

(General Hospital, Madras)

In dealing with a patient with a damaged heart the physician must not only take into consideration the state of the myocardium, valves and vessels, but must carefully investigate the oxygen-carrying power of the blood.

In India, particularly, stress has to be laid on this aspect of cardio-vascular pathology and therapeutics. Again and again, it is found that the child or young person with a mitral stenosis and dyspnoea responds well to large doses of iron,

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always been and still is good, but he is afraid to eat on account of the pain. Bowels tend to be constipated. There is no history of jaundice. Patient has been losing weight considerably of late.

Condition on admission: General condition.—Good. A healthy looking man, rather thin, but with no abnormalities anywhere except his stomach complaint.

Local condition: Abdomen.—Soft: tenderness is elicited over the upper part of the right rectus. Visible peristalsis is present.

Fractional test meal.—High acid curves, with an abrupt rise suggestive of duodenal ulcer.

No blood or mucus in any specimen.

Starch present in all specimens.

Barium meal.—Screening showed flattening and spasm of the duodenal cap; stomach of normal outline; stomach still held a small amount of barium in the 5th hour picture.

Diagnosis.—Duodenal ulcer.

Treatment.—24th May, 1937. Operation under spinal anaesthesia. Ethocain 16 c.c. of a 1 per cent sol. Abdomen opened through a supra-umbilical paramedian incision. An indurated mass of the size of a golf ball was found at the pyloric end of stomach and over the first part of duodenum. This inflammatory mass was intimately adherent to the under surface of the liver. The transverse mesocolon was so short that the colon lay across the vertebral column, rendering the usual posterior no-loop gastro-jejunostomy impossible. A posterior gastro-jejunostomy, however, was carried out by bringing the jejunum in a four to six inches loop over the fixed transverse colon. The appendix was abnormally long and was removed. On the anti-mesenteric border of the jejunum in the region where the anastomosis had to be made was a mass about 2½ inches long by ¾ inch broad. The mass, lying under the peritoneal coat, was of a light brownish colour, and of a mammillated appearance. As far as the gross appearance went, the mass suggested a lipoma, but the site suggested aberrant pancreatic tissue. In making the stoma, the tumour was removed and sent to the pathologist who reported 'a submucous adenoma in which are seen areas of glandular tissue, resembling that of pancreas', plate VIII, figures 1 and 2 (p. 71). A second report followed after many serial sections had been made and examined: it read as follows:—'Though many sections have been made and examined, only one section shows a single islet of Langerhans, thus confirming the first report'.

The patient made an uneventful recovery and was discharged four weeks after admission.

and that when the anæmia has been removed the heart again becomes able to carry on its duties without the production of breathlessness. A number of patients, indeed, who come to hospital complaining of what at first sight seems to be cardiac disease, are but subjects of advanced anæmia.

In the course of a series of investigations on cases of anæmia we have had a number of serial 2-metre telerradiographs made at the Barnard Institute, Madras, and have been struck by the decrease in the size of the heart shadow in treated cases of severe anæmia. The most striking is that cited below:—

Case 1.—A., male, aged 14 years, Hindu, non-vegetarian, carpenter, reported at hospital on 10th February, 1938, complaining of weakness, precordial

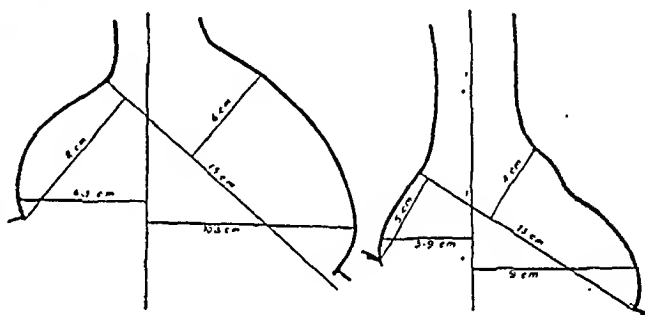


Fig. 1.

Fig. 2.

HEART MEASUREMENTS. CASE 1

	Average	On admis- sion, 10-2-38	After treatment, 13-3-38
Long diameter	.. 14.0 cm.	15.0	13.0
Transverse "	.. 10.1 "	17.2	12.9
Basal "	.. 10.7 "	14.0	9.0
Cardio-thoracic ratio	..	0.71	0.54

distress and breathlessness. The condition had set in gradually and he had not felt fit for four years. The patient was extremely pale, the body and face appeared 'puffy' and there was œdema of the feet with pitting on pressure. The conjunctivæ and nails were extremely pale, but there was no koilonychia nor was the tongue sore. The skin and the angles of the mouth appeared healthy, and careful investigation of the nervous system revealed nothing abnormal—certainly nothing suggestive of beri-beri. The urine was normal. On examination of the cardio-vascular system there was bulging of the precordium with obvious diffuse systolic heaving. The apex beat was visible, diffuse and easily palpable in the 6th intercostal space 1½ inches external to the midclavicular line. The jugulars pulsated strongly as did also the epigastrium. No thrill was felt on palpation. On auscultation, the heart sounds were loud and very easily heard; the first sound at the apex and tricuspid areas was followed by a blowing murmur not well conducted, whilst at the base of the heart there was loud systolic bruit. There was no history of rheumatism.

Tonsils normal.

Respiratory system—normal.

Spleen not palpable.

Liver palpable half an inch below costal margin; soft and slightly tender.

Examination of the blood revealed a severe microcytic anaemia with anisocytosis and poikilocytosis, but no nucleated red cells. No parasites were seen.

Faeces—numerous hookworm ova.

Van den Bergh—direct negative; indirect positive.

Icterus index 15 units.

Wassermann and Kahn reactions—negative.

Preliminary screening revealed an unusually voluminous heart, generally enlarged in all its diameters, but especially to the right.

The cardio-thoracic ratio was 0.71.

The reduced tracing of a 2-metre teloradiograph is shown in figure 1. Figure 3 indicates the condition of the blood on admission with progressive improvement.

It was decided to treat the boy as a pure case of hookworm anaemia and in order to eliminate the rest factor, he was told not to recline in bed except when sleeping, but to move about the ward and verandah. He was given ordinary ward diet, without extras such as fruit and milk or vitamin preparations.

Ninety grains of iron and ammonium citrate were given daily and the improvement can be seen in figure 3. De-worming was postponed until the haemoglobin had increased to 40 per cent when 1 c.cm. of oil of chenopodium and

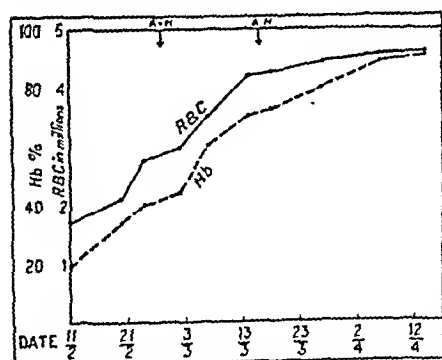


Fig. 3.—Showing response to iron and ammonium citrate, 90 grains daily, with anti-helminthic treatment (A-H). The size of the heart was reduced practically to normal limits (figure 2); the precordial pulsations and the loud systolic murmurs completely disappeared.

The boy who had co-operated well in the investigations left our wards an apparently healthy, cheerful and vigorous young specimen of humanity, having gained 20 pounds in weight, with no ova in his faeces and with a cardio-thoracic ratio of 0.54.

Another similar case is reported:—

Case 2.—C., aged 45 years, admitted for giddiness and loss of breath on exertion of six months' duration. The clinical and pathological findings were practically identical with those already quoted. Normal urine.

Hookworm ova ++.

Wassermann reaction—negative.

Van den Bergh—indirect positive, faint.

Icterus index 8 units.

Blood: Severe microcytic anaemia.

Similar treatment without rest and with ward diet was given. Iron and ammonium citrate, grs. 90 per

day, were prescribed. His red cell count reached almost normal figures in 45 days on iron alone. Two courses of worm treatment, as in case 1, were given (figure 4).

The cardiac outline on admission is shown in figure 5.

He was discharged feeling fit and strong, having put on 10 lb. in weight and with none of the systolic murmurs present on admission. (Size of heart, figure 6.)

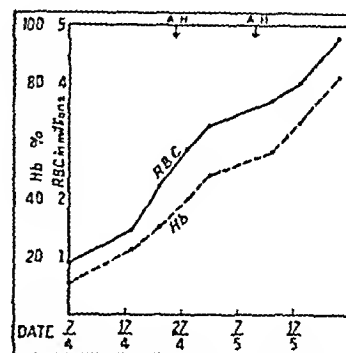


Fig. 4.—Showing response to iron and ammonium citrate, 90 grains daily, with anti-helminthic treatment (A-H).

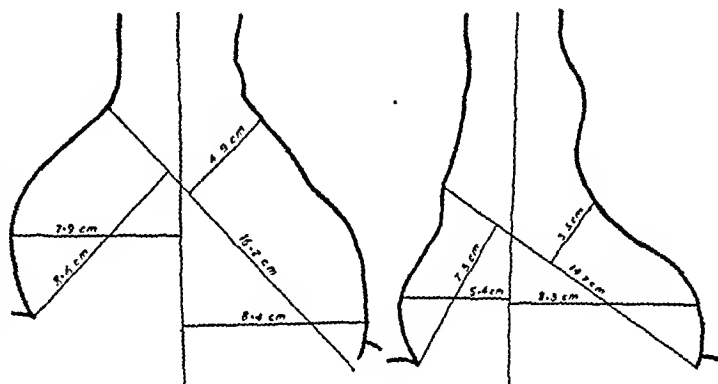


Fig. 5.

Fig. 6.

HEART MEASUREMENTS. CASE 2

	'Normal'	On admission, 14-4-38	After treatment, 14-5-38
Long diameter	.. 14.0 cm.	16.2	14.7
Transverse "	.. 10.1 "	17.0	13.7
Basal "	.. 10.7 "	13.5	10.6
Cardio-thoracic ratio	..	0.68	0.56

Such cases serve to emphasize the great efficacy of simple iron therapeutics in anaemia in India and the importance of eliminating the anaemia factor before making a diagnosis of cardiac disease.

We have to thank Dr. M. J. Santhanakrishna Pillai, Medical Superintendent, Barnard Institute of Radiology, for the teloradiographs and the measurements.

THE LOCAL PROVISION OF SPLINTS AND TACKLE FOR FRACTURES AND JOINT INFECTIONS IN INDIA

By F. H. WHYTE, M.B., M.Ch., F.R.C.S.I.

MAJOR, I.M.S.

Civil Surgeon, Ranchi, Bihar

THE Inspector-General of Civil Hospitals, Bihar, Colonel H. Stott, having kindly suggested that I should publish an account of how we prepare most of our splints for the Sadr Hospital, Ranchi, I shall endeavour to give a summary of the procedure we use here, with comments on the general situation in India, as influenced by the warm and moist climate and the shortage of funds in most of our hospitals, which shortage is inevitable in a tropical country with almost 400,000,000 inhabitants. The treatment of fractures and joint diseases occupies a very prominent part of surgical practice in this continent and tuberculosis of the bones in children, in particular, must give us all very considerable concern.

In comparison with the non-tropical and wealthier countries, which supply almost all the textbooks on orthopaedic surgery, in India, climate and expense require very definite consideration.

No one could read modern books, such as Böhler's *Treatment of Fractures*, or endeavour to practice their methods without the greatest admiration, but unfortunately the cost of usually purchased splints, the delay in obtaining them in correct sizes, and the unsuitability of extensive plasters in India, to my mind render the local manufacture of splints and fracture tackle a necessity and the elimination of most of the extensive plasters by metal frames, essential to the comfort and welfare of our patients.

It does not require much observation to see that to wear plaster jackets or spicas for fractures or tuberculosis of the spine and hip is a very severe trial, particularly in the hot weather. They are unsatisfactory as a rule to all concerned. They are often simply intolerable in the hot weather, damp and heavy with perspiration, difficult to keep clean and hard, and consequently they require repeated applications. They are depressing to the patient's health and resistance. Though occasionally one has seen satisfactory results, under good circumstances, from plasters for tuberculous lesions and fractures of the spine and hip—I now consider their only indications are fractures occurring early in the cold season. Large plasters, even in the so-called 'cold' weather, can depress the patient's health and lower his resistance against tuberculous disease.

Early last cold weather, assisted by my staff, I applied in hospital a spica for a typical tuberculous hip in a child of nine years, just showing x-ray changes. The child's progress in his own home was satisfactory for some time but towards

the end of the cold season, loss of weight with general misery and the development of a cold abscess, indicated very definite depression of resistance. We changed over to a double Thomas' hip splint and, though the hot season was against the child, the rapid improvement was noticed by all. Personally, I cannot remember seeing a cold abscess, which was on the point of rupture, clear up so quickly, or a miserable and wasted child, become cheerful and fat so rapidly.

Other arguments against these extensive plasters are the difficulty in fitting very heavy patients, the loss of time and expense of repeated applications, the slow set in the monsoon and the too rapid set in the dry heat, the difficulty with profuse discharging sinuses or wounds, the relatives do not like them and often remove them when the patient is sent home, or the patients themselves injure them, even when in hospital. Personally, I do not blame the relatives or patients for considering an extensive plaster often worse than the fracture or disease. The patient's skin in a hot climate does not stand up to pressure, if not regularly treated, in anything like the way it does in cold countries. It must be a serious mistake practically to eliminate the functions of half the surface area of a patient's skin for months in a hot climate.

It might appear a formidable proposition to undertake the manufacture and accurate fitting of splints for a district hospital and I might add that some success only leads to expansion of work in this department, but, with a reasonable scheme to begin with, the procedure is simple and the time and money saved in shorter hospitalization, easier nursing and diminished dressings, etc., are very obvious to all. If it pays to treat fractures well, it must also pay to treat tuberculous joints well.

It is astonishing what can be done if one tries and to encourage other hospitals to take up the manufacture of some of their own splints; I append a photograph of most of our equipment and give some of the features we have found essential to make it really easy and cheap. We are fortunate in having a particularly useful *mistri*, but supervision is constantly necessary.

Equipment

The tools, etc., required as follows :—

A forge—a hand-driven Buffalo forge is excellent. An anvil, tongs for dressing the fire, steel cutting chisels, steel punches, a file, strong pliers, a heavy hammer for cold riveting, a tape measure and chalk, strong scissors for cutting tin sheet and a bucket for cold water. We obtained our forge through the helpful agency of a grateful motor mechanic patient, who got it for us, 50 per cent cost price, i.e., Rs. 25. He also supplied an old Ford engine and two feet of heavy iron girder as anvils, gratis. Most of the other equipment mentioned, you can usually find in hospital or bazar.

A *mistri*—most hospitals have one on the staff. A preliminary hour's demonstration was sufficient to give him a good start in his new art. We built our first splints under the cook-house verandah one wet morning. We now use a somewhat cramped godown.

These *mistris* are extraordinarily handy, when once they clearly get the idea of what is required. Incidentally I cannot consider the time lost which I spent, in my youth, admiring the local village blacksmith at work, or, a greater privilege still, assisting him beat out a set of horse shoes. Not infrequent visits to the saddler, cobbler or tailor, I am certain, is good ground work, particularly appropriate to anyone who

plaster, pattens for boots, etc. Many other items such as bed rests, cradles for fractures, screens, etc., can be copied from catalogues, as occasion demands. In 1925 I had tonsil dissectors and forceps made in a forge in Waziristan, which I have used ever since. Though not of stainless steel, they serve the purpose in preference to others. A set of transfixion pins was another item of excellent quality made by the local representative of the surgical manufacturer as found in Razmak.

The next step was to visit a conveniently-placed ironmonger's shop. (My assistant surgeon and I selected Messrs. Dutta Brothers, Upper Bazar, Ranchi). We examined the most



intends to use his hands, not only for orthopaedic surgery but also for general surgery. These visits were a great joy to begin with, pleasant memories, and a constant help ever since. It is ridiculous to expect anyone to be able to undertake operative surgery who has only practised with a hammer and chisel on dead bone, or with a needle on lifeless intestine, in the short courses of operative surgery in a medical school.

A series of model splints, usually in sizes suitable for a child of 12, were prepared. These, the *mistri* copied from pictures in catalogues and made from flat wire binding from packing boxes, occasionally using flat iron or round iron rods, galvanized sheeting and iron rivets. Our list includes Thomas' double and single hip splints, simple spinal back splint, Thomas' knee splints, Jones' crabbed splints—arm and leg, Jones' arm-straight splint, walking irons for

suitable flat iron bars, round iron rods, rivets and galvanized tin sheeting. The materials chosen from many were:—

Flat iron rods—1 inch \times 1/8 inch \times 18 feet, costing Re. 1 each

Flat iron rods—3/4 inch \times 1/8 inch \times 18 inches, costing As. 11 each.

Round iron rods—5/16 inch \times 12 feet, costing As. 4-6 each.

Round iron rods—4/16 inch \times 12 feet, costing As. 3 each.

Iron rivets—3/16 inch \times 3/8 inch, costing As. 0-6 per dozen.

Galvanized tin sheeting—6' \times 3' \times 24-gauge Rs. 2-4-0 each.

We settled prices and a prescription form, taking copies for hospital use. On a prescription the adult patient pays Re. 1-0-0 for the iron and rivets to make a double hip splint.

A *mochi* from Dean Brothers, saddlers and boot makers, Ranchi, was called to the hospital

and shown a completed Thomas' hip splint and some others requiring leather work. Prices were fixed, i.e., for covering a Thomas' double hip frame with sheep hide, fitting chrome leather straps and buckles, adult's size, Rs. 4, and for a child's, Rs. 3. (I don't favour padding the rings of Thomas' knee splints for patients under a Balkan frame).

To complete the fracture scheme, it might appear superfluous to add the necessity of having say four to six Balkan frames. These can be made locally from teak wood at very reasonable prices, Rs. 20 or Rs. 15 each. I find a series of 2 inch screw nails at intervals along one side of the horizontals and upper halves of the uprights most useful to prevent pulleys moving out of place. These screw nails project one inch from the wood. The equipment for extension, ropes, single and double metal pulleys and sand bags, are provided at a reasonable figure from the bazar. A good tin of Sinclair's glue, which can adhere apparently whatever the weather, with a set of transfixion instruments to meet the unusual case in which loss of skin or expensive wounds preclude the use of Sinclair's glue, assist one to treat the majority of fractures with equanimity and interest. I would here remind you of the excellent and recently described method of using the elevation system of the modern operation table to obtain extension of fractures of both bones of the leg before applying plaster. I have found so far, that a loop of fine *nawar* stitched round the ankle renders a transfixion pin unnecessary.

All is now easy. A visit to the wards too often brings us to the bedside of one of those sad young patients, a child with a tuberculous hip, with anxious parents near-by. A message is sent to the *mistri* to bring his model of a double Thomas' splint. This model is laid alongside the child—the measurements from the heels, with abduction required, are recorded with chalk on the flat wire model in the *mistri's* presence and the appropriate prescription for Messrs. Dutta Brothers is written and handed to the parents, telling them the cost; in this case Re. 0-11-6. They procure the flat iron rod and rivets, hand them to the *mistri* in the hospital and assist him usually in the building of the frame, which is less than two hours' work. The *mistri* hands the frame to the nurses, who quickly wrap on a padding of old strips of condemned blankets and sheets, the parents then take the frame to Dean Brothers with the information that the splint will be completed for Rs. 3 and with any luck that child should have its splint on next morning; cost Rs. 3-11-6. The strict accountant might add two pice more for coke and condemned sheeting. For the application of the splint—the *mistri* is present with his bending pliers but he usually has the curves on the stems and cross pieces so accurately that one's hands alone can do the rest to make these lighter frames fit comfortably.

The most expensive splint we make is the double Thomas' hip splint for adults—this costs Rs. 5 or by stricter audit, Rs. 5-0-8. I have one patient in Ranchi who has worn one of these for the last two years. He had both pulmonary and hip disease with sinuses. I originally applied two plasters in which he contrived to exist for six months; a stout patient in both senses of the word. His sinuses healed in the frame and he has been afebrile and sputum-free for about 18 months. He recently developed renal colic, which indicates the necessity of turning such patients on their faces, at regular intervals, for renal pelvis drainage. It is also advisable to turn their beds round occasionally to prevent faulty attitude and pain in the neck—as they tend to look constantly towards the most acceptable view. This is particularly necessary with children. The proximity of Itki Sanatorium to Ranchi provides extra scope for this work when patients in charge of Dr. Muthu require immobilization for tuberculous bone disease.

All the hospitals and dispensaries in this district have been provided with two sizes in Thomas' knee splints with a view to the better treatment of fractures of the lower limbs and acute knee joint conditions and the safer transport of such injuries as the modern motor car provides in outlying areas. The cost of each splint was Re. 1-8-0.

It would be too much perhaps to expect that the local manufacture of splints or such equipment for your hospital will appeal to all, but I would emphasize its simplicity when the preliminary arrangements are complete. If taken up, even in the most modest way, as we are doing here, I am sure you will find it a blessing to all—the patients, the nurses, the dressers and yourselves. Should any one consider his hospital or dispensary too small to work on iron splints, well, he can always work in wood and wire. For this purpose a tool box containing a saw, a chisel, a hammer, wire-cutting pliers, a tape measure, wood awl, screw driver and screws and nails, with pieces of wire, round and flat, *nawar* tapes of sizes and a tin of Sinclair's glue will make it possible for you to deal with the occasional fracture or joint infection with some degree of confidence and comfort. It has been my experience, as a rule, that if equipment is available it will be used—if not available, a *laissez-faire* attitude is liable to be adopted.

There is nothing undignified in getting down to such a job of work as making or seeing your own splints made, and in doing so we are only trying to follow the greatest names in the profession of surgery, and I would ask you to deliberate on the remarks of Hey Groves', one of the greatest artificers of the day, 'that the proper treatment of fractures is not only a scientific problem or a philanthropic duty, but also a business proposition. In other words it pays to treat fractures well' and I leave you to

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THE TREATMENT OF OTITIS MEDIA*

By B. N. C. ROY

Late Visiting Surgeon, Carmichael Medical College Hospital, Calcutta

A busy general practitioner is much more frequently faced with the difficulty of handling a case of acute middle-ear disease than is the ear specialist. In the beginning it is so painful and distressing, particularly if the subject be a child, that it demands urgent and careful attention. Whatever is done it must assure immediate relief and produce restful sleep.

The acute symptoms take about ten days, and the discharge about twenty to disappear. The hearing comes back to normal in about a month's time. This kind of termination, without complications, is highly satisfactory. There are, however, occasions when one's best attempts and vigilant care are of little avail. Here, the type is virulent; the temperature is steadily rising; the pain is growing worse, the tympanum is red and bulging or has given way early and the discharge is profuse; the mastoid region is œdematous and tender, or meningitic symptoms are slowly appearing. The type may not be virulent or fulminating, but either the temperature is persistently high, the pain is steadily increasing, or mastoiditis, meningitis, or some other complication is unexpectedly appearing and interfering with the general progress of the case. Now, the responsibility of the family doctor is great. He is in need of assistance and better counsel. It is for him to advise the patient what to do—to seek the help of an aural surgeon, or that of an electrotherapist. I would not make this distinction except for the reason that very few of the ear specialists, so far as I know, are in favour of regular electrotherapeutic measures. There is little reliable information on this subject in the literature.

In my opinion electrotherapy can be solely relied upon for the immediate relief of symptoms such as agonizing pain, sleeplessness, vertigo, high temperature, etc., for checking the progress of the disease, and for preventing complications. This treatment can be resorted to at any stage of the disease, and the results are uniformly satisfactory.

Acute otitis media, when idiopathic, may have merely an exposure to cold or other insignificant thing acting as an exciting cause. General malaise, or fretfulness in a child, ushers in the

disease. In a good percentage of cases it is a complication secondary to an attack of influenza, tonsillitis, pharyngitis, adenitis, alveolitis, pneumonia, typhoid, measles, scarlet fever, mumps, etc. The causative organisms may be streptococci, influenza bacilli, pneumococci or meningococci. Innumerable others may be present when the communication is established with the external ear.

The temperature gradually rises. The patient complains of severe pain, usually in one ear, of an agonizing character, and either persistent or intermittent. The pain may be so severe as to radiate all over the face, head and neck of the affected side. It is the maxim of the experts in diseases of children that, when a child suddenly wakes up with a shriek, in the majority of cases, it is for earache. The pain gradually grows worse. The aching ear is usually kept away from the pillow. Auriscopy helps very little at this stage. In a good number of cases, at this stage, the analgesic and the antipyretic powders, along with the instillation of soothing ear-drops, are all that are necessary.

But when there is no response to these ordinary measures, one or two ultra-short-wave exposures, at this early stage, will not only check the progress of the disease but also give the patient immediate relief as regards pain, and in twenty-four or thirty-six hours' time the *status quo* is likely to be established.

Electrotherapy may be of immense value at later stages. It is helpful when the temperature is high and persisting; when one is in doubt whether it is still in the catarrhal stage or has suppurated; when there is a bulging of the drum, or the drum is perforated and the discharge is increasing, or has stopped suddenly with great aggravation of pain; when there is œdema and pain over the mastoid region; when one school of surgeons insists on an 'early paracentesis' of the bulging drum and the other school, more conservative, will rely on instillations and insufflations; when we do not hesitate to blame the transitory granulation tissue as it fills the aural cavity—Nature's triumphant effort to entangle and check the infection, and which slowly gets absorbed as the infection subsides making room for the ossicles to have their full play and perform their work as usual; or when these granulations are considered to be exuberant, interfering with the proper drainage and preventing the union of the drum. It is in these cases that electrotherapy should be given the trial first.

Volumes are written on the different methods of mastoidotomy, their suitability, indications, contra-indications, complications, after-treatment, causes of failures, mortality, and so forth. But all these, in the light of modern methods of electrotherapy, are purely of academic interest.

I have not seen as yet one case of acute otitis media to usher in mastoiditis, or any other complication where electrotherapy was tried early, nor I have lately seen a case complicated with

* A paper read at the clinical meeting of the British Medical Association, Calcutta, on 12th August, 1938.

(Continued from previous page)

reflect on what is to be done, especially for these young patients in India with tuberculous disease of the spine and hip, unless we can provide them with some form of frame-splint immobilization. Certainly plaster of Paris or the purchase of ready-made splints is not the answer for the immediate future.

mastoiditis, meningitis or cervical cellulitis in various stages which did not respond to ultra-short-wave exposures, when the intensity and wave-length are correctly chosen.

From the point of view of electrotherapeutic treatment it is much more convenient to divide all cases of otitis media into the following main groups:—

I. Stage of acute onset

This stage is usually over by the tenth day. It may end earlier, under treatment, if the infective organisms are exceedingly virulent. Pain and fever are the prominent symptoms. Bulging and redness of the drum appear later. Ultra-violet, diathermy, or ultra-short-wave exposures will give immediate relief to pain, and the course of the disease will be reduced to twenty-four or forty-eight hours.

II. Stage of active discharge

This stage, in the normal course, is usually over by the twentieth day. The drum is perforated in due course, or artificially. The discharge, high temperature and pain may persist. Deafness, tinnitus, vertigo and the throbbing sensation are usually there. The mastoid region may be tender. Polypoid granulations may have made their appearance.

Diathermy combined with ultra-violet, or ultra-short-wave alone will stop the pain and the discharge. The temperature will drop. The mastoid complications will quickly subside. The length of treatment required is usually from four to seven days.

III. Chronic stage

Here the pain is moderate. The discharge may be profuse, very slight or absent. The mastoid region is either painful and oedematous, or if mastoidotomy is performed it has no effect on discharge, hearing, etc. The cervical glands are enlarged and inflamed. There may also be difficulty in opening the mouth and in proper mastication. There may be daily or occasional rigor and fever. There is distinct loss of hearing on the affected side.

The average time taken for electrotherapeutic treatment, at this stage, is from seven to ten days. The type of treatment will vary according to the salient features of the case. In certain cases of chronic discharge ionization gives wonderful results.

IV. The fourth group may be called the sequelæ

There may be recurrent attacks of otitis, mastoiditis, or cervical adenitis. Persistent deafness, giddiness, tinnitus, anæsthesia or hyperæsthesia of the temporal, facial, occipital or cervical region are frequently met with.

The methods of treatment are so varied that it is difficult to enter into detail in a small compass like this. Fever-therapy has a great scope in dealing with these sequelæ.

No doubt there are benign and virulent forms. But nothing besides electrotherapy can bring

about such prompt relief of the distressing symptoms and curtail the course of the disease to such a minimum, whatever the type, nature or virulence of the infective organisms may be.

The results of electrotherapy are fairly uniform. Age, type of bacteria, associated exanthems, or general health seldom vitiate the results.

Complications like meningitis, mastoiditis, facial paralysis, cellulitis of the neck, etc., rarely occur; mortality should be unknown; the discharge stops fairly quickly; the normal hearing is soon re-established; the risk, trouble, time of an operation, or slow conservative treatment can be avoided; if early and efficient electrotherapy is resorted to.

It may not be out of place if I quote here the observation of one of the present authorities on the subject. The time of healing after mastoid operations varied from eleven to one hundred and fifty days (Campbell, 1936). Compared with this the maximum of about a fortnight's treatment for the very worst case, even for those who have undergone repeated mastoid operations without much relief of discharge, pain, or loss of hearing, should be of more than ordinary interest.

There was a time when I was keen on making repeated trials to get the best pictures of the mastoid region. Much energy and time I spent on determining the positions, measurements, angles, densities and a hundred other details to find out exactly whether the condition was cellular, diploic or sclerotic. I had long discussions with experts to find the best way to read those pictures. But now I am fully convinced that it is simply immaterial what the reaction in the mastoid cells is like. The fundamental point is the infection and that must subside. The assistance of a treatment is required to master the situation—to stop the infection. When that assistance is given, Nature will do her demobilization part successfully.

Time and labour were equally expended, year after year, on the bacteriological investigations of the causative organisms, on their variety and classification, on morphological and cultural characteristics, on virulence, pathogenicity and other biological activities, and on their toxins and enzymes. I am convinced now that the modern weapons that have found their place in an electrotherapist's laboratory will make no distinction of the class, form, number or virulence of the infective agents. It matters not whether they are exposed on the surface or hidden deep under the periosteum or in the medulla of a bone or in the base of the skull. The undepressed penetrability of these rays, the absolute certainty of their germicidal power and the toning effect of these rays on the healthy tissues, which brings back the *status quo* in any situation, are the facts that can be confidently relied upon.

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PRIMARY AND SECONDARY TUBERCULOSIS

By P. G. GOLLERKERI, M.D.

*Department of Pathology and Bacteriology, Medical
College, Rangoon*

THE common infection of tuberculosis in the adult is usually a comparatively chronic lung

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Electrotherapy is the only method, we have at our disposal, which can kill the infective organisms, and can stimulate and invigorate the polynuclears and round cells, without causing any damage or interfering with the normal functions of a single healthy cell which is performing its protective or nutritive function for the welfare of the host.

There is, of course, another side of the question. Everything has its own place, and no method of treatment can be considered as ideal, where one hundred per cent success can be guaranteed. It is just as much a mistake to suggest an elaborate and expensive electrotherapy for every case of middle-ear disease, before the ordinary, standard methods of treatment are tried, as to hurry the patient on to the operation table before electrotherapy is given a fair trial. I suggest this because electrotherapy is the simplest, cleanest and the least injurious method of treatment by which surgical or any other troublesome intervention can be spared in the majority of cases.

Judging from the frequency and importance of partial or substantial incapacity as it results from the complications of otitis media, I believe that the general standard of training in this particular branch of surgery should be raised. The simpler methods of treatment, methods that are efficient to cure a case running a normal course in reasonable time, and that are competent to prevent complications should be thoroughly impressed upon the minds of the young medical men, so that the general practitioners will be able to manage most cases and few will require any further assistance and special treatment.

If the occasion for any expert treatment does ever arise, electrotherapy should be given a trial first. In the majority of cases it will not fail. If it does, the question of surgical or any other intervention will necessarily arise, the surgeon should be particularly careful in tackling these cases. Electrotherapy seldom fails if there is sufficient tissue resistance left to make use of the rays and currents; the services of the physician, surgeon or electrotherapist are of no avail when that is lost. The surgeon deserves extra credit if he can help the patient when the situation stands thus.

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condition with the oldest lesion located somewhere in the apex of one of the lungs, more commonly the right. This apical lesion in the early stages is not easily recognizable clinically, giving only a few crepitations from a confluent tuberculous focus. Later on, this confluent caseous mass becomes liquefied and is partly absorbed and partly expectorated in the sputum, leaving a cavity behind. It is easier to diagnose the condition in this stage than in the first stage already referred to. These lesions, because of their chronicity and their slow progress, are considered in the light of modern experimental work on animals as lesions of secondary tuberculosis. It is presumed that the primary lesion, the Ghon lesion, has already occurred in these cases with complete recovery and the development of a degree of immunity which subsequently broke down to give rise to the secondary infection and chronic lesions.

Thus, tuberculosis occurring among adult city-dwellers tends to be of the secondary chronic type, as they have more frequent chances of primary infection of a low virulence, which, short of producing clinical symptoms of disease, gives rise to an immunity phenomenon that breaks down only when the second infection happens to be of a sufficiently large dose of marked virulence, or when the vitality of the subject is greatly lowered. In urban children there is always the menace of a primary infection, which, if they have normal health, may affect them beneficially, producing a degree of protective immunity against clinical tuberculosis; this is probably what happens to the majority of modern city-dwellers. On the other hand, if the child's general health is indifferent from any of the various causes of malnutrition, etc., the child may fall a prey to the infection and die of it in a short time. The lesions in such a case are usually the typical Ghon tuberculosis—an exudative caseous necrosis affecting large areas of the lung parenchyma and with less tendency to cavity formation than in the secondary type.

There is another aspect to the question of immunity in tuberculosis. The milk-borne infection common enough in cities is a bovine bacillus infection giving rise to enlargement of mesenteric and other lymph nodes which may clinically be large enough for removal by operation, and it is not fatal like the lung infection. Also, development of a bovine tuberculosis in lymph nodes, etc., in humans appears to immunize the individual to infection with the human type of bacillus—a more deadly infection—as it prefers a vital organ like the lung for its activity. It is therefore unusual to find lesions typical of the two types in one and the same individual.

The case about to be described gives food for reflection as to the possibility of a bovine bacillus changing its virulence and assuming the characters of the human bacillus, or a bovine infection not producing sufficient

immunity to protect the individual from a subsequent human infection.

Case.—Chinese female, *et.* 1 year 5 months, was admitted into the Rangoon General Hospital on 11th September, 1938, for treatment of cough and fever of 30 days' duration which had become worse four days prior to admission. On examination the lungs were 'full of râles' from the front. Consolidation in the upper part of the left lung gave the clinical diagnosis of broncho-pneumonia, left lung, with marasmus. Slight oedema of both legs was noticed. The infant was 'gasping for breath' when admitted and within two hours of admission died.

Post-mortem examination.—An extremely emaciated female child of about 1½ years with a normal skeletal growth, but a notable anaemia and much wrinkling of skin giving the 'old age' look said to be peculiar to congenital syphilis. On opening the chest a little clear fluid was found in the pleural cavities but no adhesions were apparent. The left lung in the greater part of its upper lobe showed a consolidation very like a pneumonic consolidation. The rest of the lung was fairly crepitant. The other lung was normal to the feel. When the abdominal cavity was exposed, the true nature of the condition became evident. The mesenteric lymph nodes were enlarged and matted together into a large mass with ramifications into the porta hepatis, the lesser curvature of the stomach, the pelvic and other fossae; in fact there was no part of the abdominal cavity that did not show a tuberculous caseous mass. In the region of the caecum and the last six inches of ileum, the process seemed to have infiltrated into the lumen of the gut and to have given rise to ulcerative lesions in it. The peritoneum as a whole did not appear to be involved in either a miliary or metastatic spread, except in the ileo-caecal region where groups of small tubercles were present on the serous areas corresponding to the ulcers noted above. The lungs were next taken out and examined in greater detail. The left lung was cut open longitudinally from apex to base to display the consolidated upper lobe. Its naked-eye appearance confirmed with the textbook description of pneumonia caseosa. There was no cavity formation. The staphyloid grouping of tubercle follicles typical of the common secondary lesions in the adult were altogether absent in both the lungs. The right lung, but for a small degree of oedema, did not show any pneumonic or tuberculous lesion. A mild fibrinous pleurisy was present over the consolidated part of the left lobe. The pleura elsewhere was free and transparent. The pericardial cavity contained half a teaspoonful of clear fluid with no adhesions between the surfaces. The mediastinum displayed another mass of caseous glands. A careful search was made over the surface of the brain. This was rewarded by the finding of two small greyish-yellow obviously caseous masses in the pia-arachnoid along the Sylvian fissure on one side. Smears from one of these, from the lesions in the left lung and the mesenteric nodes, all showed acid-fast bacilli in large numbers.

Histological sections were made from the lesion in the lung and the lymph nodes and examination confirmed the diagnosis of caseous pneumonia and tuberculous caseation of lymph nodes, respectively.

The spleen, liver, kidneys, adrenals, etc., did not show macroscopic tuberculous lesions. The Wassermann reaction (post mortem) of the serum was negative. With these findings a diagnosis of *tubercles mesenterica*, pneumonia caseosa, ileo-caecal tuberculosis with early involvement of the meninges was made.

In the discussion that followed the post-mortem examination the following points were brought out for explanation:

(1) Clinical human tuberculosis, whether with the bovine or the human bacillus, occurs as a bacteraemia; modern cultural methods have proved this almost beyond a doubt. In the present case occurrence of widespread lesions including those in the meninges confirms this probability.

(2) Bovine tubercle bacillus has a greater predilection for the lymphoid tissue of the body, as shown by the older lesions in the mesenteric lymph nodes in the present instance. Primary mesenteric and intestinal tuberculosis in children has been shown to be a milk-borne infection with the bovine bacillus.

(3) If it is conceded that primary infection with the bovine bacillus confers an immunity against the human bacillus infection then the lesion in the lung which is certainly the more recent in this case is also due to the original bovine infection. It is well known that primary infection with the human bacillus gives rise to lesions in the lung *par excellence* like the one seen in this case, to the exclusion of affection of lymphoid tissue. Is it possible that the original bovine bacillus has in the course of its infection and proliferation in the human body so increased in its virulence as to simulate the human bacillus and to give rise to the lesion in the lung? The other way of looking at it is that a bovine bacillæmia results in such a devitalization of the soil as to produce any kind of lesion in it. It is not uncommon to find at post mortems on pulmonary tuberculosis subjects that fibro-caseous lesions with cavities often coexist with patches of pneumonia caseosa, or miliary or metastatic tuberculosis in the lungs and other organs in the body.

(4) What are the laboratory aids that could be marshalled in a case like this to make an ante-mortem diagnosis of tuberculous pneumonia? The difficulty of collecting sputum from infants for the demonstration of the bacillus is notorious. Swabbing the throat is at best a hit-or-miss affair. The culture techniques for tubercle bacillus are impracticable for routine laboratory use and quick diagnosis. X-ray examination of the lungs no doubt will reveal the pneumonic condition, but the difficulty will be that of spotting it as a tuberculous condition.

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ATYPICAL AMYLOID DISEASE OF THE LIVER

By M. D. ANANTHACHARI, M.B., B.S.
(General Hospital, Madras)

WITH the disappearance of instances of long-continued suppuration and chronic destructive disease, cases showing amyloid degeneration have become exceedingly rare. Only one case is recorded among the autopsies at the General Hospital, Madras, during the past twenty-five years. When cases are detected on the autopsy table, unsuspected during life, it becomes evident

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A total leucocyte count theoretically should give a negative finding as compared to the usual positive finding in a coccal pneumonia. A relatively large percentage of lymphocytes in a leucopenic total count is also found in other conditions like congenital syphilis and marasmus from any cause. Of course, a positive leucocytosis with a good percentage of neutrophile polymorphonuclears may be used as a guide in diagnosing such a case as a coccal pneumonia. An immunological reaction such as von Pirquet's is useful probably only when it is negative. Thus we are confronted here with a highly unsatisfactory state of affairs in diagnosing a not uncommon condition.

It is notable that none of the external groups of lymph nodes showed any enlargement or clinical evidence of tuberculosis, as if they did, a biopsy could have given a clue to the condition.

Unfortunately, no cultures were made from the post-mortem material to identify the type or types of organisms at work in the different sites, as the special media were not available at the time.

Summary

A post-mortem examination on an infant dying of pneumonia caseosa and tuberculous involvement of lymphoid tissue in other parts of the body is described. The problem of immunity in tubercle bacillus infections and laboratory aids in the diagnosis of these conditions is discussed.

[Note.—We have no doubt that phthisiologists will have ready answers to the questions the writer has raised.

It is unfortunate that he was not able to identify the type of the organisms found in the intestinal glands and lung lesions. Whilst the bovine type usually gives rise to gland or bone lesions, it does occasionally produce lung lesions.

We cannot agree that a von Pirquet reaction would be of use, even if it were negative in such a case. It could be interpreted as indicating the absence of tuberculous infection or the absence of any resistance to tuberculous infection.—
EDITOR, I. M. G.]

that association with chronic suppuration and tissue destruction are not the invariable antecedents of amyloid degeneration. It is stated that amyloid disease may be found in association with malaria after long-continued infection or repeated attacks (Gibson, 1936; Boyd, 1938). Such post-mortem revelation has resulted in the necessity to suspect amyloid disease, even though no apparent basis for this diagnosis is noted (Bannick *et al.*, 1933). It is possible that the condition escapes recognition because it is not suspected.

Bennhold (1923), working with the dye Congo red as a stain for amyloid tissue, pointed out that intravenous injection of this dye would disclose the presence of amyloid disease during life. As a result of this report Congo red has been extensively used in suspected cases of amyloid disease and ante-mortem diagnosis has become possible. Tests both quantitative and qualitative are described and their value as clinical aids to diagnosis appraised. Through this test it has also been made possible to recognize that the process of amyloid degeneration is reversible and that improvement is possible in cases where the cause can be removed (Wallace, 1932; Walker, 1928).

Waldenström practised a system of bio-puncture suggested by Arnold Josefsen. He diagnosed the disease by examining the material withdrawn by puncturing the liver with a hypodermic needle. Of interest is his experience that, even in a patient undoubtedly suffering from amyloid disease, the hepatic cells aspirated by a fine needle are always healthy, unless a piece as large as a liver acinus (about 1.5 mm. diameter and 2 cm. in length) is removed. He concludes that a probability from more clinical evidence becomes a certainty by such examination.

Depending as it does on the mass of existing amyloid tissue in the body, the Congo-red test has its limitations. It is not possible that the test will reveal early cases. Bennhold observed that patients with extensive amyloidosis, especially, amyloidosis of the liver, practically all gave positive Congo-red tests and that it was only when the deposits of amyloid were not extensive that one might obtain a negative Congo-red test. In the case under report this statement is probably borne out.

Is it possible that amyloid disease could arise primarily without any discoverable cause? Perla and Gross (1935) raise a point whether some previous suppurative process might not initiate a disturbance in protein metabolism, which would survive the initial perverse impetus. Boyd (1938) mentions a case where there was extensive amyloidosis without any discoverable cause at autopsy. Only very few cases appear to be reported where there was no cause. Might it be that in such cases diet produces a disturbance which hitherto was conceived to be initiated only by tissue destruction? Experimental evidence suggests that diet, particularly cheese,

has its share of influence in the aetiology of the disease. It is also not known what it is that determines the site of such changes or how it is that in certain cases the amyloid change is diffused and in certain others it is localized as tumour mass.

Case record.—A man, aged 35 years, was admitted into the wards of the General Hospital, Madras, for pain and enlargement of the abdomen.

A labourer, he was a poorly nourished man with a protuberant abdomen which he complained was gradually becoming harder and bigger. He had pain round the waist and in the epigastric region, particularly after food though his appetite was good. He was not constipated. There was nothing abnormal in his diet.

On palpation of the abdomen the liver was felt as a hard mass extending across the epigastrium to the left hypochondrium. It was firm, smooth and painless and had a rounded edge. In the left hypochondrium it felt slightly harder in consistency than elsewhere, where it simulated very closely in all clinical details an enlarged spleen. For diagnostic purpose the mass in the left hypochondrium was punctured with a hypodermic needle of fairly large bore. The aspirated material was a clear jelly-like substance of the consistency of boiled sago, without any trace of blood in it. The material was sent to the pathologist and his report is appended.

Screening the stomach with barium showed that it was normal in shape and movements. It appeared pushed forward and to the right.

There was neither anaemia nor jaundice. His urine was normal. The van den Bergh test was negative and the icterus index 7 units. Blood cholesterol was 179.4 mgm. per cent. The aldehyde and Chopra tests for kala-azar were negative. Blood serum for Kahn's test was negative.

To eliminate the possibility of a latent focus of sepsis, white blood cell counts were repeatedly done and the maximum count was only 9,900 cells per c.mm. Armet's count showed no shift to the left. Sedimentation rate, according to Zeehwer and Goodall, was 2.4 cm. in 1 hour. Functional test for liver with leuculose was normal.

To verify the histological findings Congo-red tests were carried out according to methods described by Taran (1937) and Todd and Sanford (1935). Both the tests gave normal healthy figures.

The patient according to his statement felt better and at the end of two months gained eight pounds in weight. He left hospital at his own request and against advice, with the liver in the same condition.

Pathologist's report.—Smears stained with methyl violet show small masses of metachromatically (pink) staining, wavy, branching macaroni-like bands of a homogeneous substance, with fine bluish-staining fibrils separating the individual strands. Occasionally, scattered between these masses of pink-staining cylinders are clusters of large polyhedral cells (staining blue) which in some places appear compressed and elongated. A few collections of degenerate leucocytes are also seen. The endothelial lining of the capillaries which can be clearly distinguished in some places appears to be free from Leishman-Donovan bodies.

The general appearance is not unlike that of a smear of an amyloid liver in which extensive amyloid deposition has led to marked disappearance of the parenchyma cells.

Comment

The outstanding points in this case are the absence of any clinically discoverable cause for the condition; the difference between the two parts of the enlarged liver, the failure of the Congo-red tests, and the normal function of the liver. Autopsy elucidation was however absent

That none of the known causes for amyloid disease is present cannot be asserted in this case. There is however no evidence of chronic sepsis or suppuration. Might it be that the causes for the enlargement for the right and left halves of the liver are different, the left lobe alone being affected by amyloid disease? Rosenblum and Kirshbaum (1936) in classifying amyloidosis mention a possible localized involvement with amyloid, which may occur within neoplasms or chronic inflammatory areas. Such would explain the failure of the Congo-red tests on the basis of insufficiency of amyloid material to give a positive test. The absence of ascites, jaundice, the good functional condition of the liver, in spite of its size, are points of interest.

In this connection, it is to be noted that Paunz test is associated with certain practical difficulties. The amount of Congo red to be injected is bulky. It is sometimes found difficult to draw blood at the end of one hour, as the rapid coagulation of the blood in the needle interferes with aspiration. A similar observation is made by Wallace (1932) and Becker. The test is not delicate and it is useless in early cases. Its only virtue is that it can be carried out in places where colorimetry is not possible.

Wallace (1932) claims that the Congo-red method possesses obvious advantages over Waldenström's bio-puncture. According to him it gives a quantitative result and is somewhat less drastic. In the case reported, without the puncture the disease would certainly have been missed. Where suspicion of the disease is strong from clinical evidence and requires only confirmation the Congo-red method will be the choice. In other cases where the clinical history does not lead to suspicion at all or where the disease is very early, bio-puncture alone can supply unequivocal evidence. The method of bio-puncture is not however available where kidney alone is the site of amyloid disease and where the liver and spleen are not enlarged for safe puncture. Where the kidney is affected early, the disease is more readily recognized by examination of the urine and the associated clinical evidence of poor kidney function. It is in cases in which the liver or the spleen alone is involved primarily that, if a Congo-red test, which is not infallible, fails, the disease will be altogether missed.

Summary

1. A case of amyloid disease of the liver with unusual features is reported.
2. The usefulness of the Congo-red test and bio-puncture is discussed.

Acknowledgment

I am grateful to the superintendent, General Hospital, Madras, for permission to publish this case.

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AN INVESTIGATION OF CALCUTTA MILK SUPPLY FOR PRESENCE OF TUBERCLE BACILLI

By R. K. GOYAL, F.R.S.E., D.Sc., M.R.C.P.

and

S. LAL, M.B., B.S.

From the Bacteriological Department, School of Tropical Medicine, Calcutta

IN view of the growing interest and increased incidence of tuberculosis in India, it is extremely important to determine the various sources of dissemination of tubercle bacilli. It has been estimated that as many as 40 per cent of cattle are tuberculous in certain parts of England and about 7 per cent of samples of milk in London contain tubercle bacilli. Although milk is generally boiled in India before consumption yet the intimate contact of cattle and people in India calls for a searching enquiry into the incidence of tuberculosis in cattle in this country. We have approached this problem by examining the milk supply of Calcutta for the presence of tubercle bacilli.

The presence of tubercle bacilli in milk has been determined in Europe by centrifuging a certain amount of milk, pooling the cream and the deposit and injecting it into two guinea-pigs. We found that this method could not be adopted in Calcutta. The injection of the mixture of cream and the deposit led to the death of the guinea-pigs within 48 hours. In the next experiment, milk was received directly from the udder into sterile test-tubes, but the guinea-pigs inoculated with the pooled samples died in 4 to 20 days. An examination of 14 samples of milk revealed the presence of the following organisms:—(1) streptococci, (2) pseudo-anthrax bacilli, (3) yeast-cells, (4) *B. tetragenus*, and (5) lactose fermenting Gram-negative bacilli. The microscopic examination of the smears of the mixture

of the cream and the deposit from centrifugalized milk failed to show the presence of acid-fast bacilli. We then adopted the following method which proved fairly satisfactory:—

Sixty c.cm. of milk were centrifuged for 30 minutes at 2,500 r.p.m., the cream and deposit were pooled and treated with four times their volume of 5 per cent NaOH for 30 to 45 minutes, and the mixture was shaken thoroughly every five minutes. It was then centrifuged for 30 minutes at 2,500 r.p.m., and the deposit was neutralized and suspended in sterile normal saline. Two guinea-pigs were injected intramuscularly with 5 to 10 c.cm. amounts. In spite of these precautions, it was found that an injection of 10 c.cm. often caused the death of the animals within 18 days, hence the amount was later reduced to 5 c.cm. The inoculated animals were tested at intervals of a fortnight by an intradermal injection of 0.1 c.cm. of a 1/10 dilution of tuberculin. The animals not reacting to tuberculin were kept under observation for at least three months and then sacrificed. The post-mortem examination was done very carefully and films of the suspected organs were examined for presence of acid-fast bacilli.

The samples were collected from various areas of Calcutta, both from the dairies and individual milkmen. One hundred and eleven samples were examined, each sample represented milk from 5 to 15 cows. As 31 samples caused the death of the guinea-pigs within 18 days, only 80 samples were left for consideration. Seventy-eight out of the 80 samples gave completely negative results, the tuberculin reaction was faintly positive in two cases, the animals were found to have a small abscess at the site of inoculation and the corresponding glands were slightly enlarged. Filamentous acid-fast organisms characteristic of actinomyces were found in films. A suspension of the suspected organs was injected into a series of two new guinea-pigs and a rabbit; it was found to be non-pathogenic.

Discussion

An examination of 80 samples of milk from various areas in Calcutta failed to reveal the presence of tubercle bacilli. As each sample was derived from at least five cows, it is clear that at least 400 cows were examined. The absence of tubercle bacilli in milk does not necessarily mean the freedom of cows from tuberculosis. Taylor (1918) examined 6,490 slaughtered cattle at Ferozepore, 3.4 per cent had tuberculous lesions, practically all of them were of a localized nature. The microscopic examination revealed the presence of acid-fast bacilli in 60 out of 2,701 cattle (2.2 per cent). Soparkar and Dhillon (1931) examined 1,116 slaughtered cattle at Lahore, 255 or 22.85 per cent were found to be infected with tuberculosis and tubercle bacilli were detected in the smears, some more animals were found infected by the animal tests. The rate of infection varied with different kinds of animals examined. In cows it was 21.3 per cent, in buffaloes it was 23.6 per cent and in bullocks it was 31.6 per cent.

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*A thorough post-mortem examination failed to reveal any tuberculous lesions in the animals injected with the 31 samples.

PROTECTION OF ANTI-PLAGUE WORKERS

By R. C. BHARGAVA, D.P.H.,
District Medical Officer of Health, Ballia

With the advent of gassing of rat holes and other efficient methods of disinfection and disinfection, it seems necessary that greater attention should be paid to the protection of anti-plague workers.

All the workers down to the coolies and peons should have a thorough knowledge of the ways in which plague spreads through fleas, the habits of fleas and also of the ways in which pneumonic plague spreads.

All the workers should have proper uniforms. I should suggest white uniforms; the uniforms should be white from the top to bottom, i.e., white boots, white putties, white trousers, white coat and white neck and face protector. If no putties are worn, the trousers should be longer than usual. The boots should be without laces and holes. Such boots can be made by incorporating elastic into the sides. The coat should have a high and tight collar. The head and neck protector should consist of a bag of cloth which will cover the whole head and neck with a high and well-fitting collar at the lower end and a purse string at the top of the head. There should be holes for the eyes. Materials for a mask and goggles should always be ready in the pocket.

Protection of hands is necessary for those who are engaged in the cyano-gassing. It is possible that fleas may attack the hands. Fleas are now and then found on the hose pipe and these will attack the hands if the coolie is unwary.

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With regard to the presence of tubercle bacilli in milk Joshi (Datta, 1935) and Gloster (Datta, 1935) examined at least 775 samples, but could not demonstrate any tubercle bacilli by guinea-pig inoculation. Joshi (Datta, 1935) found acid-fast bacilli in 47 out of 674 samples (7.6 per cent), but these were non-tuberculous to guinea-pigs. It is possible that some of the acid-fast bacilli seen in the smears from the organs of cattle were not mammalian tubercle bacilli. Further work is required to elucidate this point.

Summary.—An examination of 80 samples of milk from various sources in Calcutta failed to reveal the presence of tubercle bacilli.

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For the protection of hands during cyano-gassing operations in the infected locality, I should suggest a glove of thick rubber protecting the coolie from the tip of the fingers to the elbow.

This uniform has been suggested for the following reasons, which anti-plague workers should always keep in their minds :—

Fleas are often found in the streets of infected villages because people throw the dead rats out.

Infected fleas are almost invariably found in the infected houses and will jump up on the legs of anyone entering.

Infected fleas may fall down from the rats in the roofs of the infected huts when the roof is of thatch or tile.

Pneumonic complications may be present in cases of bubonic plague and one must always have masks and goggles ready.

Anti-plague workers should cultivate the habit of stamping their feet on the ground so that fleas may be shaken off if any be there.

Plague workers should always work in batches of two, so that they can scrutinize each other's uniforms, as it is certain that fleas will be found on persons entering plague-infected houses, of course most frequently on the boots and the putties. If any fleas are seen they should immediately be killed with kerosene oil, which should always be ready at hand.

Plague workers should not be given too much work or else they are liable to become careless. They have to keep standing throughout the period they are in the infected area and they have to keep on their guard continuously. Under such conditions the periods of rest are essential.

When entering an infected house, disinfection should be begun from the very door. All the dead rats and dead bodies should be thoroughly drenched with kerosene oil emulsion of sufficient strength. No place should be entered until thoroughly drenched with kerosene oil emulsion.

All the staff engaged in anti-plague work should be vaccinated against plague without fail beforehand.

Plague is a winter disease and clothes are often so coloured as to conceal the flea. Fleas found in the plague-infected houses are almost black and will be easily concealed on a woollen cloth of dark blue, brown and red colours. Plague workers should avoid these colours. I have suggested white above for the sake of contrast. White boots and putties suggested above should be kept as white as possible.

It may be objected that in winter woollen clothing is necessary. Woollen underwear can be used and that should suffice if work is carried on during the warmer period of the day, and this

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A NOTE UPON AN INTERESTING SEROLOGICAL TYPE OF LEPTOSPIRA IN THE ANDAMANS

By B. M. DAS GUPTA

Calcutta School of Tropical Medicine

IN course of their investigation into leptospirosis in the Andamans, Taylor and Goyle (1931) isolated the causal organisms from 28 cases and differentiated them into two distinct serological types, namely, Andamans CH11 and CH31. They further showed that the type strain CH11 was unique in that it was serologically distinct from several strains of leptospiræ isolated in different parts of the world. Lately, by the courtesy of Major B. Chaudhuri, I.M.S., Senior Medical Officer, Andaman and Nicobar Islands, some sera of the cases of Weil's disease were received. One of these failed to agglutinate the type strain CH31 and gave only a little reaction with CH11. As the clinical manifestations exhibited by the patient were very suggestive of Weil's disease, we tested the serum against three other strains in our possession, but none showed even a slight evidence of agglutination. The remainder of the serum was, therefore, sent to Professor Schüffner at Amsterdam for testing against several other strains. (He keeps a large stock of leptospiræ of different

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period is best suited for work among the poor people as they seldom have warm clothes.

[Note.—We submitted this for an opinion to an experienced officer. His comment seems to us to be quite worth adding to this short note.

The precautionary measures recommended are ideal ones, theoretically, but may not be practicable in all instances, particularly in cases of small municipalities and where the work is purely of a temporary or an urgent nature. The uniform, recommended for all the workers, such as white putties, white trousers, white coat, white neck and face protector, white boots without laces and holes, and with elastic sides, is an elaborate one.

All that is necessary in the case of coolies employed in anti-plague work is (a) protection of workers by inoculation with anti-plague vaccine, (b) wearing of white overalls, and (c) smearing of the hands up to elbows and legs up to knee joints with kerosene-soap emulsion daily just before starting the work. These simple methods have been found to be quite efficient in practical work.

Risk from pneumonic plague infection is not great, at least in India.

Nowadays all cyanogas work in anti-plague campaigns is done with calcid briquettes. These can be used by men with some preliminary training and under good supervision without much risk, either to the workers or to the public. Gas masks are, however, still necessary if large rotary machines are used in this connection. This is rarely the case.

The shorter hours of work and frequent intervals of rest recommended are very useful suggestions.

The article as a whole is good and may be useful to those who are not in a position to read the instructions issued from time to time by some of those provincial and State governments to whom plague is still an important public health problem.—EDITOR, I. M. G.]

THE DISPOSAL AND UTILIZATION OF HORSE DUNG AND STABLE LITTER BY COMPOSTING

By K. A. PATWARDHAN, M.Sc.

Daly College, Indore, C. I.

Introduction

THE development of the Indore process to utilize as humus the waste products of agriculture in 1930-1931 by Sir Albert Howard and Y. D. Wad (1931) suggested its application to horse manure and stable litter, as a very desirable modification.

Such a modification will be chiefly suitable to the stables at the military stations in British India, and in Indian States and at the stables of other private individuals (owners of polo ponies and race-horses). The number of animals (horses and mules) in these military stables in India is over 50,000.

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serological types.) The results furnished by Professor Schüffner are presented below :—

Strains	Agglutination titre of the patient's serum
90 C	3,000
Wijnberg	100
Canicola	100
Rachmat	0
Salinem	0
Sw. v. Tienen	0
Naām	30
Semarang 173 .. ..	..
Batavia 46	0
H. C. .. ..	..
3705	0
Sarmin .. ..	..
Moscou V	0
Andam. Ch 11	100
Hebdomadis	0
Ballico	0
Pomona	0
Benjamin	100
Djasiman	0

It will be seen from the above results that the infecting organism in this case is serologically homologous with a bat strain, inasmuch as the strain 90 C was recovered from the cerebrum of a bat (*Cynopterus*) in Batavia. This is the first time that a human serum gives a good reaction with this strain.

Summary

A new serological type of leptospira in the Andamans is recorded.

My grateful thanks are due to Major B. Chaudhuri, I.M.S., who sent us the serum and to Professor Schüffner and Dr. Gispén of Amsterdam, who carried out the agglutination tests referred to above.

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Sanitary disposal of wastes from these stables is of the highest importance to all military establishments. At present the residues are sold at a rate varying between As. 6 to As. 7 per animal. The *gwalas* (Indian milkmen) usually purchase this material to feed their milch cattle with it. It is needless to emphasize how insanitary and dangerous this practice can be to the health of their customers, specially to the infant population.

A small stable usually with 8 to 10 ponies is maintained for the training of Kumars at the Daly College (a residential institution for the education of the sons of chiefs in Central India). This seemed to be a very suitable ground for a preliminary investigation into the possibilities of adopting the Indore process for the disposal

of garden sweepings and fallen leaves collected from the college compound. Wood ashes from the kitchens of the Kumars and ordinary black soil from the fields or dug out from the drains were also easily available. The trial started from October 1931 and compost has been regularly made since then up till 15th August, 1938.

The experience gained and its possible application to military and other stables is discussed below. Two sizes of pits have been used here, the length of the pit running across the prevailing direction of the wind, (1) 30 feet \times 14 feet \times 2½ feet and (2) 14 feet \times 10 feet \times 2½ feet. The available material (averaged for the whole period) worked out as follows (Table I), its chemical composition is given in Table II.

TABLE I
Raw materials annually available and compost made

Kind of raw material	Rates	Quantity of raw material used per year in lb.
Horse dung	* From 10 horses at 25 lb. (with moisture percentage 33.0) per head per day.	91,250
Litter	* From 10 horses at 15 lb. (with moisture percentage 20.3) per head per day.	54,750
Garden sweepings (air dry) .. .	At 3 cu. ft. per day and at 4 lb. per cu. ft. ..	4,380
Fallen leaves (air dry) .. .	At 3 cu. ft. per day and at 4 lb. per cu. ft. ..	4,380
Kitchen ash (air dry) .. .	At 30 cu. ft. per year and at 25 lb. per cu. ft. ..	750
Black soil (air dry) .. .	At 30 cu. ft. per year and at 70 lb. per cu. ft. ..	2,100
TOTAL WEIGHT OF RESIDUES USED		157,610 (i.e., 70.36 tons)

Total of air-dry compost obtained per year = 174.25 cartloads.
(Where 1 cartload = 20 cu. ft. and 1 cu. ft. = 25 lb.)
= 87,125 lb. (i.e., 38.90 tons).
Therefore percentage of compost obtained = 55.3.
* Average obtained from the record of six years.

TABLE II
Chemical composition of the raw materials used for composting

Particulars	L.N.46C/38 sample of horse-dung compost	L.N.55C/38 sample of fresh horse dung	L.N.56C/38 sample of fallen leaves	57C/38 sample of stable litter
Percentage moisture (on fresh basis)	Reported (7.66)	32.92	22.65	20.28
Percentage on oven-dry basis:—				
Total nitrogen (by Gunning Kjeldhal method).	Reported (1.20)	1.44	1.34	0.93
By Robinson and McLean's method:—				
(i) Carbon	9.64	20.91	17.42	19.58
(ii) Nitrogen	1.20	1.37	1.48	1.17
(iii) C/N ratio	8.03	15.26	10.11	16.73
Ash	68.56	21.99	46.26	19.15
Loss on ignition	31.44	78.01	53.74	80.85
P ₂ O ₅	0.66	0.86	0.19	0.57
K ₂ O	0.42	0.39	0.20	0.33

of horse manure and stable waste in a sanitary and profitable manner.

Material.—The wastes available were mainly litter and horse manure with a small proportion

The procedure.—The vegetable waste from the different parts of the college compound is daily brought and collected in a heap layer by layer within easy reach from the pits. The

Industry, Indore, between 1936 and 1938. The results are given in table VI.

I am also grateful to Mr. F. K. Jackson, Ex-Director, and Mr. T. R. Low, the Director of the

TABLE VI
Response of cotton to composts and commercial fertilizers
Total yields of Kapas—lb. per acre
N applied at 18 lb. per acre

Manures	1936 KHARIF		1937 KHARIF	
	Field 42S (rich soil)	Field 12A (well drained)	Field 42N (rich soil)	Field 12C (well drained)
Control	263	375	884	445
Farm compost, 2,136 lb. per acre	295	470	862	389
Horse-dung compost, 1,912 lb. per acre.	395	463	815	464
Municipal compost, 2,400 lb. per acre	390	485	903	452
Safflower cake, 705 lb. per acre	380	574	718	483
Ammonium sulphate, 90 lb. per acre	428	560	878	464
Nicifos 22/18, 100 lb. per acre	348	693	953	426
Remarks	Insignificant	Significant	Insignificant	Insignificant
Significant difference	×	109	×	×

Scope in military and other stables.—It is expected that 25 lb. of horse dung and 15 lb. of litter are ordinarily available every day for each animal housed in the military and other stables in India. Fallen leaves and other residues in the compound collected in the usual routine can also be utilized instead of being burnt; vegetable ashes and earth if available may be used but are not essential, as the natural properties of stable wastes enable them to be composted by themselves. Lieut.-Colonel T. M. Carpendale, C.-in-C. of I. S. A., has already successfully tried this process on a large scale.

The practicability of adopting this process under such conditions seems therefore to be clearly established. The 50,000 odd animals in these stables will yield about 892.8 tons of wastes, capable of producing 493.7 tons of compost per day, equivalent to an annual production of 180,290.5 tons worth about 4½ times as many rupees, i.e., at least Rs. 8,11,307-4.

The plant nutrients supplied by this quantity of compost will be equal to—

- (1) 937.5 tons of P₂O₅.
- (2) 1,171.9 tons of potash.
- (3) 1,478.3 tons of nitrogen.

In addition to an income of nearly Rs. 2,55,980 instead of Rs. 2,25,000 by the current method the further advantage of improving the sanitation of milk production in the areas will be secured, it being possible to feed the milk animals more efficiently and with greater safety with the fodder crops produced from the compost.

Acknowledgments

I am greatly indebted to Mr. M. G. Salter, M.A., Principal, Daly College, Indore, for the facilities and encouragement given and the keen interest taken in the work since its inception. I

Institute of Plant Industry, Indore, and Mr. Y. D. Wad of the Institute for giving me full facilities at the Institute for securing help and advice whenever needed. Thanks are also due to Major Johnson Cole, O.B.E., for getting for me the detailed figures from the Army Lists, showing the minimum computation of horses and mules and to Lieut.-Colonel T. M. Carpendale, Commander-in-Chief of Holkar State Army, for permitting me to refer to his successful attempts of adopting this process on a large scale.

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A Mirror of Hospital Practice

AN INTERESTING CASE OF CHRONIC TETANUS

By P. N. KAPUR, F.R.C.P.E., D.P.H., M.R.C.S.
Divisional Medical Officer, N. W. Railway, Multan

THE following case seems worthy of note not only because of the survival of the patient after tetanus infection, but also on account of the comparatively rare mode of infection.

Mrs. X., aged 40 years, was admitted into the N. W. Railway Hospital, Multan, on 11th April, 1938. She complained of bleeding from the vagina for the past two weeks and difficulty in opening her mouth, for the past week. During this period of two weeks she was examined twice by a *dai*.

On admission, it was found that she was 3½ months pregnant and threatened abortion. She was put on bromide and chloral mixture and 3,000 international units of anti-tetanic serum were given.

On 12th April she had profuse bleeding and passed a portion of the foetus. Her uterus was emptied.

On 13th, she complained of pain and stiffness in the back of the neck and remarked that formerly she had

difficulty in opening her jaw, but now she was not even able to turn her head to one side or the other. She was x-rayed and the skiagram showed no evidence of pathological change in the temporo-mandibular joints nor carious teeth. An attempt was made to open her jaw under chloroform, but this met with no success. She was then diagnosed as a case of tetanus and was given immediately 8,000 units of anti-tetanic serum intramuscularly.

On the morning of 14th slight convulsion of her body began. The number of convulsive attacks during the day was not less than six and each attack lasted for a few seconds. She was given another injection of 8,000 units of anti-toxin.

On 15th the number of convulsive attacks was only two and the rigidity of the neck was slightly less. She was given another injection of 6,000 units of anti-toxin.

On the morning of 16th she was given another injection of 6,000 units of anti-toxin. By evening her condition showed definite improvement as the convulsive seizures ceased entirely and the stiffness of the neck lessened and the spasm of the lower jaw eased.

Her condition gradually improved and before her discharge from the hospital on 29th April, she was able to eat her ordinary food.

Comments

1. The disease appears to have been the result of infection through the vaginal mucosa caused by the introduction of sepsis as the result of examination by the *dai*.

2. The incubation period appears to have been under seven days.

3. The case belongs to the group of cases termed chronic tetanus.

4. The case was a typical one, as the chief symptoms were trismus, stiffness of the muscles of the neck and tonic spasm of the muscles of the trunk.

5. The course of the disease was practically apyrexial.

6. The absorption of anti-tetanic serum by the intramuscular method being slow, the maximum concentration of the serum in the patient's blood was not reached until 48 hours after the injection from which time the improvement started.

My thanks are due to the Chief Medical and Health Officer, N. W. R., Lahore, for having permitted me to publish this case.

COD-LIVER OIL TREATMENT OF A CARBUNCLE AND TWO ULCERS

By B. M. ROY, L.M.P.

Assistant Medical Officer, Nonapara Tea Estate,
Dimakuchi

Case 1.—A male coolie, aged 40 years, was admitted into the hospital on 9th November, 1936, for the treatment of a very extensive, ulcerated foul-smelling, non-diabetic carbuncle on his back. After incision cod-liver oil dressing was applied from the first day. For the first week the dressing was changed twice daily, then once a day. Complete healing took place in 19 days and the patient was discharged on 28th November.

Case 2.—A coolie girl, aged 14 years, was admitted on 23rd April, 1937, for the treatment of 'Naga sore' on her left leg. Cod-liver oil dressing was applied very thickly and was changed twice a day for the first six days, then once a day. The ulcer healed in 17 days

and she was discharged on 11th May, fit for work on the garden.

Case 3.—A male coolie, aged 26 years, was admitted on 18th July, 1937, for the treatment of a chronic ulcer



Fig. 1.—Case 1.

on the left leg, duration more than one year. He was also treated with cod-liver oil dressing in the same way as case 2 and the ulcer healed in 20 days.

In all these cases no other antiseptic dressing, tonic or injection to help healing was given except six grains of quinine daily.



Fig. 2.—Case 2.

Advantages of this dressing

(1) It is painless, both for application and removal of dressing; (2) slough disappears very quickly and removal of the same by surgical

measures is not required; (3) healthy granulation forms in a very short time; (4) patients like the oily application for which they themselves plead; (5) it is cheaper in comparison to other antiseptics.



Fig. 3.—Case 3.

I am grateful to Dr. E. Burke, my chief, for his permission to send these case notes for publication.

POISONING BY BITE FROM *BUNGARUS CAERULEUS* WITH RECOVERY

By A. R. D'ABREU, F.Z.S., L.M.S.S.A. (Lond.), I.M.D.
Civil Surgeon, Gujrat, Punjab

PYARE LAL, son of Subha Ram, age 22 years, of Nalagarh State near Simla, a juggler, had been in the habit of eating snakes. His performance consisted in biting off the heads of snakes at the neck, then chewing and swallowing them. His supply of snakes was obtained from snake charmers and he informed me that he did not know the difference between the poisonous and non-poisonous varieties but that he would depend upon the snake charmers to give him only the non-poisonous varieties.

At Kunjah, six miles from Gujrat, he did not find any snake charmers and he decided to find some snakes for himself. He came upon a dark steel-black snake about two feet long with regular white ringed markings all down its body. He controlled the reptile with a small stick and then caught hold of it with his hand about a span's length below the head, whereupon it immediately turned round and bit him on the hypothenar eminence of the right palm, he then let go his hold and had to shake the creature off which shows that the bite was a fairly sustained one.

This occurred at about 8 a.m. on the 24th July, 1938. He immediately sucked the wounds and tied a ligature round his wrist. He apparently felt no effects local or

otherwise during the morning or afternoon, but by 9 p.m. the same night he came to the civil hospital, Gujrat, with fully developed symptoms of colubrine venom poisoning. He could hardly sit up, streams of tenacious mucus were flowing from the corners of his mouth, the eyes were half closed, the face and lips moderately cyanosed, the tongue was only protruded with difficulty, he was conscious and had a peculiar indistinct slurring speech but was able to give a fairly good account of himself. Respiration was a little laboured, pulse fast and full and there was no rise of temperature. He was capable of moving the upper and lower limbs slowly to any position desired, tactile sensation did not seem impaired, the tendon reflexes were hardly elicited, the body was cold and there was great prostration. There was no swelling or pain about the two small punctures which were opened up freely and treated with potassium permanganate, as there was no anti-serum available.

PROGRESS OF THE CASE

25th July, 1938.—8 a.m. temperature 97.4°F.; 4 p.m. temperature 100°F. All symptoms were aggravated and the cyanosis of the lips and face was very marked and little hope was entertained for his life as asphyxia was increasing and he appeared to be sinking fast. There was now also difficulty in swallowing, pain was complained of in the abdomen and palpation elicited definite mild retraction of the rectus muscles but there was no tumidity, visible distension or dullness. Though lying in a very drowsy state he informed me between breaths and with great difficulty that he felt that air did not seem to get into his lungs. At 12 noon the pulse was 120 and respirations 48 per minute. At 12-15 in the afternoon 10 c.cm. of anti-serum C from the Pasteur Institute of Paris, which is labelled as specific against the venoms of *Naja* and *Bungarus* snakes of India and Egypt, was given intravenously. That is about 28 hours after the bite. At 9 p.m. the cyanosis had lessened a little and he said he felt better. The ptosis was the same and it was very difficult for him fully to open the eyes or look up. He took a little soda water and the salivation appeared slightly less. Atropine 1/100th grain was injected with good result on the excessive salivation. The pain and retraction of the abdominal muscles was about the same. There were moderate ronchi and râles all over the chest. The pulse was fairly full and regular from the time of admission.

26th July, 1938.—8 a.m. temperature 97.6°F. and pulse 96 per minute; 4 p.m. temperature 100.2°F. and pulse 130 per minute. Condition had generally improved and all symptoms were abating.

27th July, 1938.—8 a.m. temperature 102.4°F. and pulse 130 per minute. At 12 noon the temperature was still 102.4°F., with pulse rate 136 and respirations 52 per minute. When it was felt that all was going well it was discovered that pneumonic consolidation had developed at the base of the left lung. The patient became restless and vociferous but seemed mentally clearer and was losing his drowsiness. The drooping eyelids were about the same and the face slightly cyanosed and pinched. The temperature at 4 p.m. was 102.4°F., pulse 134 and respirations 48 per minute.

28th July, 1938.—8 a.m. temperature 100°F., pulse 112 and respirations 48 per minute; 4 p.m. temperature 100°F., pulse 122 and respirations 36 per minute. Appears weaker. He had been trying to sit up and walk in spite of warnings and restriction. Face drawn and pinched but mental faculties clearer. The drooping eyelids and drowsy appearance are passing away and salivation has ceased. Breath sounds of left lung hardly audible and there is no bronchial breathing or bronchophony, but dullness is present. The bowels are open and there is a strong desire for food.

29th July, 1938.—8 a.m. temperature 98.6°F., pulse 102 and respirations 28 per minute; 4 p.m. temperature 99.6°F., pulse 122 and respirations 28 per minute. The left lung has very slight dullness at the base and a few moist crepitations. A slight irritable dry cough is present, with whitish-yellow, frothy and partly sticky

expectoration. Heart sounds strong and pulse good and regular. There is no drooping of eyelids now but pain is complained of in the eyes. The tongue is moist and there is a strong desire for solid food. (The obvious clinical signs and symptoms of a pneumonia of the left lung which developed suddenly on the 27th July seem to have practically disappeared, this being the third day since these lung symptoms were observed.)

30th July, 1938.—S. a.m. temperature 98.2°F. and pulse 101 per minute; 4 p.m. temperature 99.6°F. and pulse 102 per minute. From this date onwards the patient rapidly improved and was discharged on 6th August.

He was shown my collection of Punjab snakes amongst which I had placed two specimens of *Bungarus caruleus* and on being asked to select the particular snake by which he had been bitten, he promptly pointed out these two kraits.

On interrogating this patient after recovery he stated that he had often been bitten by non-poisonous snakes and was also in the habit of allowing them to bite him for purposes of display in the presence of an audience.

It is probable that the hypothenar eminence of the palm of the hand having a thick epidermis and the fangs of a krait being comparatively small, penetration may not have been very effective the fangs only just reaching the verge of the vascular tissue, besides the punctures were immediately sucked.

In the literature on snakes, snake-bite and poisoning by the venom, authors consider the quantity of venom available in *Bungarus caruleus* as being about three lethal doses for man and that the virulence is about four or five times greater than that of cobra venom.

There appear grounds for assuming that the quantity of venom ejected by the *Bungarus caruleus* is comparatively small and for this reason it is probably a very potent poison even in minute quantities. The fangs of the blue krait are comparatively small and fine compared with those of cobras or vipers and, although the store of poison may be adequate, the jet of venom ejected must be a very fine one and therefore the quantity emitted during a bite comparatively less in the same way as we might compare the jet from the fine needle of a hypodermic syringe with that from a large bore one fitted to the same instrument, assuming the bite in most cases to be a very rapid or momentary process.

An examination of the fangs of *Bungarus caruleus* also reveals that they are frequently not completely tubular, this incompletely canalculated condition resulting in a groove on the anterior aspect of the fang may be due to imperfect development or insufficient age, and this imperfection would allow for leakage of venom along the fang in the reptile's mouth through the open segment of the canal.

Poisoning by the venom of the krait is generally considered to be most dangerous. From the literature accessible to me recovery from the

bite of a krait is rare, hence this case may be of interest to readers.

A RECURRENT STRANGULATED HERNIA INGUINALIS TREATED BY SECTION OF THE SPERMATIC CORD

By S. K. SEN, F.R.C.S.E.

Honorary Surgeon, Irwin Hospital, Delhi

and

R. H. CANDY

Lieutenant-Colonel, I.M.S.

Chief Medical Officer, Delhi Province

W. A., aged 50, male, was admitted to the Irwin Hospital on the 8th June, 1938, with a strangulated hernia presenting a typical picture of acute intestinal obstruction.

General condition on admission.—The patient was a thin-built adult with signs of leprosy. He had three fingers missing from the right hand and two fingers missing from the left, while there were areas of anaesthesia on both upper and lower extremities. His nasal discharge was examined bacteriologically but no lepra bacilli were detected.

The tongue was dry and coated and his pulse rate was 84 per minute. His temperature was normal. The abdomen was distended and very tender all over and there was a very tender and tense swelling in the right scrotal sac. The scars of three previous operations were present in the right inguinal region.

Previous history.—The patient was operated upon in Madras in 1932 for strangulated hernia on the right side, in 1931 he was again operated upon in Madras for a recurrence of the strangulation, and in 1935, in Calcutta, he was operated upon for the third time for a further recurrence of the strangulation.

The history of the present recurrence was of 24 hours' duration. The patient had had three vomits and complained of pain and swelling in the right inguinal region, with absolute stoppage of faeces and flatus for the past 24 hours. Shortly after admission the strangulation was reduced by taxis, after which the abdomen became soft, and faeces and flatus were passed freely during the ensuing two days. The internal ring at that time admitted four fingers.

Forty-eight hours later, the strangulation recurred and an operation was decided upon.

Permission was obtained from the patient for removal of the right testicle.

Operation notes.—On 11th August, 1938, the patient was operated upon under gas and oxygen anaesthesia. A liberal elliptical, transverse, incision was made to enclose the three previous operation scars which were then excised. The sac was isolated and opened and the loops of bowel were examined and replaced in the abdomen. The sac was then transfixed and the spermatic cord divided between two clamps at the level of the internal ring. The proximal cut end was ligated and sutured to the under surface of the internal oblique. The inguinal canal was radically closed by suturing the internal oblique and the conjoined tendon to Poupart's ligament with strong silk. The right testicle and the distal end of the spermatic cord were then removed and the wound closed in layers.

The patient made an uneventful recovery except that there was slight superficial sepsis at the medial end of the wound, which was detected when the first dressings were removed on the sixth day. The stitches were removed on the ninth day and the wound was perfectly healed.

on the twelfth day. The patient was discharged cured on the 39th day.

The reason he was not discharged earlier was that it was considered desirable to watch the patient as long as possible as there are no facilities of follow-up for the patient.

Remarks.—Burdick and Higginbotham adopted this drastic procedure of cutting the spermatic cord in 200 cases of recurrent inguinal hernia. They advocate that the testicle should be left undisturbed and in their experience it does not usually necrose. They reported 6 deaths in 200 cases and were able to follow up 169 cases, out of which there was a recurrence of the hernia in 20 (11.8 per cent). The testicle sloughed in four cases and suppurated in 17 per cent.

In this case the testicle was removed because of the high percentage of sepsis given in their figures.

Recurrent inguinal hernia is fairly common but the recurrence of strangulation is not at all common according to the experience of most surgeons. This case is of particular interest because of the fact that three previous herniotomies were performed on the same side and each time strangulation was present. The above operation of radical herniotomy was performed when the patient presented himself for the fourth time as a case of acute strangulation on the same side.

A CASE OF GUNSHOT WOUND OF LUNG

By B. S. MADAN, L.S.M.F.

*Sub-Assistant Surgeon, in charge, Civil Dispensary,
Mand (Baluchistan)*

J. B., a female, aged 30 years, was admitted into the dispensary on 29th May, 1938, for gunshot wound of the lung.

She was sitting on the floor and was shot from a distance of about 5 feet. The bullet passed through the body and entered the carpet.

The bullet entered the body half an inch to the right of the lateral sternal line in the 2nd inter-costal space, passed through the body and made its exit from the back $3\frac{1}{2}$ inches to the right of the post-median line in the 9th inter-costal space.

The wound of entrance was a quarter of an inch in diameter and wound of exit was three-quarters by half an inch. Both the wounds were almost circular and similar in appearance without any bruising or laceration of surrounding parts. There was only slight hæmorrhage. Temperature 100°F ., and pulse 120 per minute.

Wound of entry was painted with tincture of iodine and dressed with sterilized dressing. Wound of exit and its surroundings were cleansed (no fragments of bone were found) and wound was effectively packed. Morphia $\frac{1}{4}$ of a grain was injected to allay the nervous anxiety. Calcium lactate was given for five days afterwards. Dressing was renewed daily and the wounds healed without any difficulty and the patient was discharged on 25th June, 1938.

Points of interest are :

1. Patient was seven months' pregnant and did not miscarry after such a great and sudden shock.

2. Bullet passed straight through the body apparently without any deflection or deviation and without causing much damage.

My thanks are due to Lieut.-Colonel B. H. Kamakaka, I.M.S., for permission to publish this note.

A CASE OF CŒLIAC DISEASE

By NIHAR KUMAR NAG, M.B.

Bagerhat

A MALE child aged one and a half years was brought to me by his parents for diarrhœa with frequent offensive stools. The boy was healthy up to the age of 1 year but later on he began to pass diarrhœic stools which gradually increased. When he was brought to me he was suffering from diarrhœa and the stools were bulky and particularly offensive. There was loss of appetite.

History.—He is the first child of his parents, who are healthy. He was fed on artificial food from the age of nine months.

Examination.—The boy was markedly emaciated and anæmic. Wasting was most marked round about the buttocks. The face was very little affected. The abdomen was markedly protuberant and felt doughy. There was no sign of free fluid in the abdomen. The boy was very irritable. Growth was markedly below par. Liver slightly enlarged. Spleen not palpable. The boy used to pass about four to five stools a day which were large, pale, extremely offensive and frothy. Dentition was normal. There was no rickety rosary, nor Harrison's sulcus present. No enlargement of epiphyses was detectable. Blood examination showed marked anæmia.

The case was diagnosed as one of cœliac disease.

Treatment.—The treatment was mainly dietetic. He was given skimmed milk, about one quart a day, one over-ripe banana, and orange juice four ounces a day.

To prevent complications such as may occur from low fat diet, he was given Adexolin (Glaxo) 10 minims three times a day with milk. The boy improved gradually with this treatment and is now quite healthy except that he is slightly stunted in growth.

Comments

1. Cœliac disease is comparatively rare in Bengal.
2. It is very liable to be mistaken for rickets.
3. The treatment is easy and very effective.

[*Note.*—Cœliac disease is a clearly defined clinical entity in which there is, amongst other things, an increase of fat in the stools. In this case there were many symptoms suggestive of cœliac disease, but a more thorough investigation, including chemical examination of the stools, would have to be carried out to establish the diagnosis.

A condition similar to the one described is not uncommon in children in India; this condition responds well to a fat-free high-protein diet with an adequate supply of all the vitamins. Established cœliac disease is not usually so readily amenable to treatment.—
EDITOR, I. M. G.]

Indian Medical Gazette

FEBRUARY

OUR DAILY RICE

NATHAN Gowland Hopkins, when in 1906 he foretold that there were many substances other than protein, fat, carbohydrate and inorganic salts essential to the maintenance of life, nor Casimir Funk, when six years later he invented that most attractive catchword 'vitamine', could have had any idea of the stimulus their work on this fascinating group of accessory food factors was to have on the whole study of dietetics throughout the world.

The wise physician has never underrated the importance of diet in the treatment of the sick, but at the beginning of the present century in western countries the field of dietetics, in as far as it was applied to the general supposedly-healthy population, was mainly left to food cranks, who were as wrong in most of their fads and fancies and in the baseless theories that they propounded as they were right in their insistence that more attention should be paid to diet, and to the occasional newspaper 'stunt' such as the eat-brown-bread movement of a quarter of a century ago. In eastern countries, and certainly in India, the main influence, other than economic and agricultural, in determining the diet of the people has been, and still is, ingrained custom supported by religious dogma.

In Europe and America the attitude of the man in the street to his diet has been entirely changed during the last decade; he has at least been made food conscious. The work of Hopkins, Funk, McCollum and other scientists has been carried on and enlarged upon by the advertiser and the columnist so thoroughly that the average individual has gained the impression that, if he were to take a number of pills containing the whole range of vitamins, he could dispense with proteins, fats and carbohydrates altogether. Even the medical profession has not escaped the over-emphasis on these very important, but still *accessory*, food factors; there are however signs that this phase is already passing and the interest aroused in the subject of food is being shared more evenly amongst the different constituents of a balanced dietary.

On the scientific side India has not been far behind other countries, but in this large and relatively poor country the time lag between the scientific appreciation of facts and the dissemination of the new knowledge amongst her 400 million inhabitants is considerable. A beginning has, however, been made, the medical man, the sanitarian and the social worker have little excuse if their knowledge on dietetics is rudimentary or out of date because during the last decade much work that is directly applicable to

the dietary problem in India has been carried out, and the results made easily available to any educated individual who has the desire to increase his knowledge. But the educated are only a small percentage of our vast population and the real problem is to carry the knowledge to the illiterate or barely-literate villager. Then, having carried this knowledge into the village, are we certain that it is going to be of any value? The answer is that, if it is the right kind of knowledge, it certainly is. It is, for example, no use telling the Bengal villager that rice is poor in certain constituents and that he must eat wheat, nor even that he should eat any particular kind of rice. He will have to be satisfied with the rice that he himself grows or the kinds that are available in the neighbourhood, and above all with the food that is within the reach of his very limited resources. But it is possible to tell him how he should prepare his rice so as not to impair further its nutritive value and how he can economically supplement his diet and supply some of the important food factors that are deficient in a pure rice diet.

Rice has come in for a great deal of ill-deserved abuse. Its defects are that its vitamin B₁ content is low, its protein percentage is distinctly below that of wheat, and it is deficient in calcium, with a disproportionately high phosphorus/calcium ratio. The vitamin B₁ is further decreased when the rice is highly polished or 'over-milled'. Over-milling also reduces the protein and fat content to an appreciable extent.

On the credit side we have the fact that the protein of rice is of a comparatively high biological value, distinctly higher than that of wheat for example, so that the lower protein content of the former is to a large extent compensated. In fact a good quality hand-pounded rice will have a biological protein value which, gramme for gramme, is very little short of that of an equal amount of wheat. Similarly, the vitamin B₁ content of hand-pounded rice is sufficient for normal requirements. This leaves only the calcium deficiency which must be made up. Amongst the cereals *ragi* millet is the richest in this substance; most of the pulses also have a good calcium content, but if economic conditions allow this deficiency cannot be made up more suitably than by the addition of milk to the diet. Further, rice is a fairly easily digestible substance if suitably prepared and it contains little indigestible cellulose matter. Its capacity for holding water in its cooked state makes it a very suitable food for a hot climate where a high fluid intake is a great advantage.

The fashion for eating milled rice was undoubtedly set by the upper classes to whom the clean shining highly-polished grain had an æsthetic appeal. Amongst people of this class who take a variety of other dietary substances to make up for the deficiencies, it is quite a suitable pabulum for the provision of calories, but the tragedy of this modern tendency was only appreciated when the practice was taken up by

the poorer classes in the community, who depend almost entirely on rice for their nourishment. Paradoxically, it is amongst the better class people that the disadvantages of milled rice are now appreciated; this has led them to demand hand-pounded rice with the result that the price of this commodity has risen correspondingly and is still further out of the reach of the poor.

This appears to provide an opportunity for useful legislation, but the problem is not quite as simple as it appears at first. Husked unpolished rice does not keep as well as does polished rice, on account of the presence of an enzyme in the outer coat of the grain that is capable of splitting the rice fat and turning the rice rancid. Times have changed and it is not always easy for people to go back to the old practice of each day pounding only enough rice for their daily needs. Machinery has come to stay and it is more in keeping with the times if, instead of trying to put the clock back, we attempt to advance further by standardizing machine milling and limiting the degree of polishing, and by studying methods of storing and preserving rice, or by encouraging the more extensive use of rice polishings as a supplementary dietary substance in the Indian household.

In a paper in our January issue Dr. Sreenivasan has discussed a number of points in connection with rice as a food, to some of which we have already referred. He has drawn attention to the fact that in the past agricultural experts have concentrated on producing rices with a high crop yield and of fine appearance. From the

producer's point of view both these qualities are desirable, but from the point of view of the consumer a rice with a higher protein content is what is required, and he considers that to achieve this should be the aim of agricultural research in India in the future.

Overshadowing all is the economic state of the country and the stark fact that a large percentage of the population has not the money nor the means to provide the minimum caloric requirements of the household, but this aspect of the problem is outside the scope of the present discussion.

As a sole article of diet rice, especially polished rice, is unsuitable, being deficient in certain important substances. As the staple article in a mixed diet it is excellent, for tropical climates, probably better than any other cereal in common use. It is possible that by legislation certain abuses in the preparation and marketing of rice which affect its nutritive value deleteriously could be prevented, and it is more certain that by agricultural research and judicious selection the quality of rice generally available could be improved. But the final solution of the problem is in the Indian home and the real responsibility rests with the Indian housewife, and those who educate and advise her. Except in the definitely indigent household, whatever rice is available the deficient substances can be provided at very little extra cost and appetizing dishes, representing a 'balanced' dietary, can be prepared to suit the tastes and pockets of each class.

Special Article

'PATENT' MEDICINES, THE PUBLIC, AND THE DOCTOR

By E. S. PHIPSON, C.I.E., D.S.O., M.D., M.R.C.P.
COLONEL, I.M.S.

Inspector-General of Civil Hospitals, Assam

I. The nature and scope of the problem

MAN, even in his most civilized state, is a creature endowed with remarkable powers of credulity, powers which operate sometimes to his advantage but generally to his undoing, and in no department of life are these powers more manifest than in those matters which concern his bodily health.

In a recent lecture on the subject of Obscurantism in its many forms Lord Horder (1938) pointed out that even in highly civilized communities the mysterious form of cure often makes a greater appeal than does a plain and logical statement of how a given disease may arise from some particular departure from physiological rectitude, and how the trouble may be set right. 'What', asked Lord Horder, 'is the secret of the quack's success?' The answer he suggested is

that the patient is induced to think as follows: 'The quack is not trained and he is not recognized by law; how clever he must be to be able to cure people! His power is a direct and supernatural gift; a power which, on that account, must clearly be superior to even the highest skill which comes from a long and painstaking study on the part of the registered practitioner'.

In former days the quack was an itinerant vendor of his own nostrums, and his powers for good or evil were limited to the range of his own voice, and to such a *clientèle* as he could develop, in the towns which he visited, by favourable reports from the people among whom he moved. If he was a rogue, he was an amusing rogue, who lived by his wits, aided by a very useful and penetrating knowledge of human nature, and did very little harm. The pictures drawn by the American author, O. Henry, in *The Gentle Gaffer* of this type of quack, *Montague Silver* and *Jeff Peters*, were no doubt roughly applicable to the fraternity in all parts of the world.

The modern world, however, is very different, and a situation has arisen which deserves the serious attention of every thinking man and

woman. Throughout the United Kingdom, and to an ever-increasing extent in India, every man, woman and child, who can read, is constantly being subjected to the most skilful advertisement propaganda in newspapers, magazines, buses, hoardings, aeroplanes, stamps and the wireless (but not, fortunately, from Empire transmitters) designed and directed by experts in advertising on a scientific basis of applied psychology, with the single-minded intention of selling as much of a given product as possible for a given outlay on advertising—in the jargon of this very modern profession, 'overcoming sales-resistance', with complete and cynical disregard for the consequences to the unfortunate citizen whose 'sales-resistance' has been thus overcome, and who has been successfully persuaded that he is suffering from some disease, and must purchase the only effective remedy for it.

Some time ago the writer was called upon by the representative in India of a well-known preparation who asked the writer's opinion of his firm's product. The writer replied that he had a higher opinion of his firm's product than of their commercial morality. The representative showed pained surprise. This firm had within recent years, the writer explained, after half a century or more of blameless trading, embarked on a policy of intensive advertising designed to convince any person complaining of certain symptoms that he is suffering from a particular malady, and that if such a person takes this product for three months he will get well. The firm's representative, who was an agreeable and well-educated man, protested that he could see no indication of commercial immorality in this type of advertisement until the writer pointed out to him that the sufferer was subjected to a threefold suggestion: (a) that he was suffering from a particular malady; (b) that if he consulted a doctor (which he was represented as doing in the advertisement) this 'diagnosis' would inevitably be made by the doctor, who would order him to take the advertised product for three months, and (c) that he would recover as a result. The evil effect of these suggestions, the writer explained, was not that the sufferer was persuaded to take the firm's product for three months, which, indeed, might in itself be beneficial, but that of the wholly false suggestion that if he went to a doctor, complaining of that group of symptoms, the doctor would immediately and necessarily recognize them as indicating the minor disability suggested by the advertiser, and would prescribe the product accordingly. The symptoms complained of, the writer argued, might well be early symptoms of real and serious constitutional disease, and the sufferer, who might otherwise have sought medical advice, would be dissuaded from doing so by the advertisement and thus waste three precious months before obtaining proper diagnosis and treatment, a delay which might conceivably cost him his life, or, possibly, months or years of ill health. The firm's representative eventually

appeared to see the point and even promised to bring the matter to the notice of his Board of Directors!

The writer has related this story in detail to illustrate and emphasize what may well be regarded as one of the most sinister characteristics of the traffic in 'Patent' medicines, tonic foods and the like—the manner in which the wiles of the advertiser are used to exploit the credulity and the fears of the sufferer. The example quoted is not by any means one of the worst. Examples will occur to every reader of newspaper advertisements designed to induce every sufferer from dyspepsia to believe that he is suffering from gastric ulcer or carcinoma, every sufferer from chronic nasal catarrh that he is in the early stages of pulmonary tuberculosis and so on, and, by making capital out of the fear-complex induced in sensitive or neurotic persons, to secure them firmly as purchasers of the advertised product for as long as possible; and when it is borne in mind that in the daily press in England about one-sixth of all the advertising space is occupied by advertisements of proprietary remedies, and in the lower-grade weekly papers nearly one-third, it will be obvious that there must be very few sufferers from any common disease who are not constantly being subjected to suggestion from advertisements of this character.

II. Attempts to solve the problem

The whole question of the ethical and practical considerations involved in the patent medicine traffic has recently been summarized in a little monograph by Professor A. J. Clark, F.R.S., Professor of Pharmacology and Materia Medica in the University of Edinburgh (1938); the subject of quack medicines has recently been debated in the House of Lords after an admirable speech by Lord Horder, and in India it has been referred to by Colonel Chopra, Director of the Calcutta School of Tropical Medicine, as far back as 1923 in his Presidential Address to the Medical and Veterinary Section of the Indian Science Congress at Lahore, again in the Report of the Drugs Enquiry Committee and in his recent Presidential Address to the Annual Conference of the Bengal Pharmaceutical Association, reported in the *Statesman* of 13th September, 1938, which issue also contained an editorial on the subject which was very much to the point.

Professor Clark's monograph is a brief but comprehensive study of the whole problem as it presents itself in England, and the writer strongly recommends this small monograph to the attention of anyone interested in the subject. In the preparation of this article the writer has drawn freely on that valuable source of information, and on the Report on the Debate in the House of Lords (*B. M. J.*, 1938).

The attention of the medical profession and to a limited extent of the public was called to the question of the quack medicine trade by the publication of two volumes, 'Secret Remedies'

(1908) and 'More Secret Remedies' (1912), embodying the results of a long series of analyses of secret remedies carried out for the British Medical Association by the late Colonel E. F. Harrison, who, during the latter part of the Great War, was Controller of the Chemical Warfare Department of the Ministry of Munitions. These publications were received with great interest by the medical profession and the public but were practically ignored by the Press, presumably for reasons of policy.

In 1914, Parliament appointed a Select Committee on Patent Medicines which produced a compendious and very strongly-worded report and made some very practical recommendations regarding registration, disclosure of contents and censorship of advertisements, not one of which has since been adopted by Government. This report was unfortunately published on that tragic day, the fourth of August 1914, and received only a fraction of the attention it deserved, and would otherwise have commanded. There was no doubt of the Committee's views on the subject. Their general conclusions were as follows :—

'That the trade in secret remedies constituted a grave and widespread public evil; that the existing law was chaotic and had proved inoperative and that consequently the traffic in secret remedies was practically uncontrolled.

That this is an intolerable state of things and that new legislation to deal with it, rather than merely the amendment of existing laws, is urgently needed in the public interest'.

In 1917 Parliament passed the 'Venereal Disease Act' which forbade treatment of these diseases otherwise than by duly qualified practitioners, and expressly forbade the advertisements or sale of any remedies purporting to cure these diseases.

Another Bill dealing with patent medicines was introduced in 1931 without success, and again in 1936 a measure, with a very limited scope, designed to remedy some of the worst abuses of the trade, was introduced, but came up for second reading on the day of the Grand National, a circumstance which effectually sealed its fate as the House was 'counted out'.

With the sole exception of the very limited provisions of the Venereal Disease Act of 1917 the British law stands exactly as it did in 1914, when the Select Committee summed up the situation in the following words :—

'The situation, therefore, as regards the sale and advertisement of proprietary medicines and articles may be summarized in one sentence as follows :—

For all practical purposes British law is powerless to prevent any person from procuring any drug, or making any mixture, whether potent or without any therapeutical activity whatever (as long as it does not contain a scheduled poison), advertising it in any decent terms as a cure for any disease or ailment,

recommending it by bogus testimonials and the invented opinions and facsimile signatures of fictitious physicians, and selling it under any name he chooses, on the payment of a small stamp duty, for any price he can persuade a credulous public to pay'.

The medical profession as a whole is an uncompromising enemy of secret remedies, and as far back as the eighteenth century it was decided that it was unprofessional for a doctor to use remedies of whose nature he was ignorant or to keep secret the nature of the remedies he used, and these salutary principles still apply. Critics of the medical profession are apt, even in these days, to attribute the opposition of the medical profession to secret remedies to fear of 'competition', but as Professor Clark points out, there is nothing in this argument because secret remedies cause far more disease than they cure. While it is perfectly true as a general statement that doctors as a whole are opposed to secret and proprietary remedies, the statement requires some qualification for more than one reason.

Proprietary remedies, which include so-called 'patent' medicines (in reality a misnomer as no secret remedy can become the subject of a patent, and no new drug can itself be patented but only its process of manufacture), comprise a very wide range of medicaments, including some of the most valuable substances known to medical science as well as some of the most impudent frauds which are sold to the public. There are also the so-called 'ethical' proprietary medicines advertised (at any rate at the outset of their career) only to the medical profession by circulars, or through the medical press, as well as the 'non-ethical' group which are advertised to the public direct. Many doctors are in the habit of prescribing some proprietary mixture of known, or approximately known, composition, because it is more convenient or has some other desirable quality not possessed by a mixture made up by the local pharmacy. Even these preparations, carelessly used, can be dangerous particularly if they are in a concentrated form. The writer was once called to see the wife of his motor-driver, who was said to be possessed by a devil, but on whom the usual incantations had been found ineffective. It was evidently a case of strychnine poisoning, but the source of the poison could not be discovered until it was found that, a week before, the man had sent his wife to a dispensary doctor who had prescribed a well-known 'tonic' made by a firm of the highest repute. This 'tonic' contained a small dose of strychnine, about 1/120th grain to the drachm, and the patient had been told to take a teaspoonful three times a day. The patient being a Somali woman, and not knowing what a 'teaspoon' was, used the only spoon she knew of, which was of the hand-made African variety, fashioned out of box-wood and holding nearly one ounce, and, to ensure a more rapid cure, she had taken four

doses a day instead of three. She had thus taken about a quarter of a grain of strychnine every day for a week, when she started to develop opisthotonos. The dispensary doctor was surprised when the writer told him, in no uncertain terms, that, if she had died (fortunately she recovered), he would have been morally responsible for her death, for prescribing for an ignorant woman so potent a medicine in an undiluted form. Apart from proprietary mixtures there is also the group of 'household' remedies, the sale and use of which imply no danger to the public.

Thus, the best and worst are easily recognizable but the intermediate group are very difficult to classify from an ethical standpoint.

It is a somewhat humiliating, though perhaps a salutary, reflection that the medical profession as a whole is said to be as susceptible to suitably contrived advertisement as the general public, and the proof of this lies in the steadily increasing proportion of drugs prescribed in the United Kingdom, and doubtless in India, of drugs under proprietary names, which have non-proprietary equivalents which are equally good and much cheaper. Under the British scheme of National Insurance the proportion of drugs prescribed under proprietary names has risen to 30 per cent. The proprietary firm scores, the patient is no better off and the additional cost falls on the tax-payer.

III. Harmful effects of the patent medicine trade

The harm done by patent medicines, Professor Clark points out, may be considerable and sometimes direct in its operation. Fortunately the Dangerous Drugs Act prevents the sale in patent medicines of a number of dangerous drugs. There is with certain proprietary articles, such as medicated wines, more than a possibility of the production of addiction. The 1914 Committee mentioned 12 such wines with an alcoholic content varying from 16 to 21 per cent. These are said to find a ready sale among teetotallers who may perhaps be quite innocent of their alcoholic content, as, in some cases, no indication is given on the bottle.

Accidental poisoning sometimes occurs with the cheaper varieties of headache powders which contain acetanilide, a drug which is little used by medical men on account of its toxicity in some individuals. Attempts to reduce the manufacturing costs of patent medicines may lead to disaster; for instance, when one firm specializing in abortifacients substituted tri-cresyl phosphate for oil of apiol, an expensive commodity, a number of cases of paralysis resulted. Similar disasters resulted from the inclusion of amidopyrin in a proprietary yeast preparation, with several deaths from agranulocytosis as a result. Secret remedies for obesity containing di-nitrophenol have led to numerous fatalities, but both di-nitrophenol and amidopyrin have now been included in Schedule 4 of the Poisons List and

cannot be sold except on a medical prescription. One of the worst disasters of this kind was that which followed the introduction in America of a semi-'ethical' elixir of sulphanilamide, which is insoluble in water, but was found to be soluble in a solvent related to glycerine, di-ethylene glycol. The solution, in a given strength, was put on the market but without the nature of the solvent being disclosed. The comparatively small amount, 6 gallons, actually put on the market and consumed by the public ultimately caused no less than 73 deaths. *The Journal of the American Medical Association* commented on this disaster editorially as follows:—

'While it seems unbelievable that any manufacturer would circulate and promote the use of preparations for internal use without adequate preliminary tests of toxicity on animals and man this incident shows that it can be done.

Sixty persons have been sacrificed simply because the toxicologic observations now reported were not determined in advance by a manufacturer who had no hesitancy in importing physicians to use the elixir. Both chemical and medical literature contain references to the toxicity of di-ethylene glycol in the amounts recommended by the manufacturer.

Surely there has been no blacker picture of the inadequacy of our present food and drug laws or the lack of common scientific decency in drug manufacture than that illustrated by this tragic disaster'.

Although this happened in America, there is nothing whatever to prevent it happening in England or in India. The Poisons Acts always lag far behind advances in chemical and pharmacological research and though they can safeguard the public against scheduled poisons and drugs of addiction, they cannot legislate against drugs so recently discovered or, as in the case of di-ethylene glycol, so unexpectedly employed, that they have not found their way into the Schedule. One of the most sensational cases of poisoning in recent years was that of a Pittsburgh millionaire who died of radium-poisoning after having taken a 'patent' medicine for a number of years which actually did contain an appreciable quantity of a radio-active substance.

Lord Horder, in his speech before the House of Lords on 26th July, 1938, said that he had been warned that if he raised this subject he would be charged with trying to create a monopoly for himself and his colleagues, and to deprive the poorer classes of cheap cures, to the efficacy of which they constantly testify. Lord Horder maintained that if there was any question of monopoly it lay with the patent medicine trade which bled the British public annually to the extent of between £25,000,000 and £30,000,000, nearly as much as the total money spent on hospital services in England. In point of fact the debate in the House of Lords did produce in the daily press, as many will remember, a crop of letters denouncing Lord Horder in much the same terms as he had anticipated.

The main burden of Lord Horder's argument was the absurd and incongruous situation that had arisen. On the one hand the British Government had launched a campaign to improve the national physique, had recruited large numbers of people whose business it was to know something about health, had set aside subsidies for the purpose of education and demonstration in regard to fitness and had spent substantial sums of money in health propaganda. On the other hand they had this campaign of quack medicines and 'tonic' foods, totally uncombated so far by the Government, but led by very subtle and skilled generals, bent on maintaining national ill health, moral and physical, in order to have a ready sale for their goods. For every £100 that Government spent on making people health-conscious, quack medicine-mongers spent £1,000 on making them disease-conscious. The Government were trying to teach people the meaning of nutrition, and the money the people might spend on suitable food they were spending on quack medicines or on very poor substitutes for good food. If the State thought it right to protect the property of its less wary citizens by enacting legislation to limit the evil called 'share-pushing', was it not right to take measures to protect the health of its less wary citizens from wanton damage from clever and unscrupulous advertising propaganda in the field of quack medicines and 'tonic' foods?

IV. Proposed reforms

The three essential reforms proposed by the Select Committee in 1914 are set out in Professor Clark's book and are as follows:—

(1) Registration

'That there be established at the Department concerned a register of manufacturers, proprietors and importers of patent, secret and proprietary remedies, and that every such person be required to apply for a certificate of registration and to furnish (a) the principal address of the responsible manufacturer or representative in this country, and (b) a list of the medicine or medicines proposed to be made or imported'.

(2) Disclosure of contents

'That an exact and complete statement of ingredients and of the proportion of the same and every patent, secret and proprietary remedy, of the contents other than wine, and the alcoholic strength of every medicated wine, and a full statement of the therapeutic claims made or to be made; and a specimen of every appliance for the cure of ailments other than recognized surgical appliances, be furnished to the Department, such information not to be disclosed, except as hereinafter recommended, the Department to control such statement, at their discretion, by analyses made confidentially by the Government chemist'.

(3) Control of advertisements

'That it be a breach of the law to give a false trade description of any remedy, and that the following be a definition of a false trade description; "A statement, design or device regarding any article or preparation, or the drugs or ingredients or substances contained therein, or the curative or therapeutic effect thereof, which is false or misleading in any particular", and that the onus of proof that he had reasonable ground for belief in the truth of any statement by him regarding a remedy, be placed upon the manufacturer or proprietor of such a remedy'.

The Committee made a number of other recommendations. Amongst them was the following: 'That all advertisements of remedies for diseases arising from sexual intercourse or referring to sexual weakness be prohibited'.

They also recommend that advertisements likely to suggest that a medicine is an abortifacient be prohibited and that advertisement of remedies for the following diseases be prohibited:—

Cancer.	Diabetes.	Locomotor ataxy.
Consumption.	Paralysis.	Bright's disease.
Lupus.	Fits.	Rupture (without
Deafness.	Epilepsy.	operation or
		appliance).

The crazy inconsistency of the law is indicated by the fact that out of this long list of suggestions action has been taken only in a single case, namely, the prohibition of advertisement of remedies for venereal diseases. The success of this prohibition proves that such measures are practicable and effective.

Professor Clark recommends, and the writer agrees with him, that the disclosure of the contents of every proprietary remedy should be made not only to the Government Department concerned but displayed in intelligible terms on the label of each package.

V. The position in India

The time may come when some such restrictions will become law in India; the literate element of the Indian population are not so far subjected to such an intensive propaganda as are the people of England. In India the quack medicine advertisements in vernacular papers and papers printed in English are largely concerned with 'cures' for impotence and other sexual disabilities; they do not deal with ills of humanity as comprehensively as they do in England, nor do quack medicine advertisements in India comprise, except in a few papers of the baser sort, so large a proportion of the total advertisement-revenue as in England where, as we have seen, the proportion is from one-sixth to one-third of the total. It is perhaps worthy of remark that, no doubt as a result of the wide publicity given in India to the topic of tuberculosis in connection with Her Excellency the Marchioness of Linlithgow's Appeal, advertisements of a 'cure' for tuberculosis, which was

thoroughly discredited in England many years ago, are now appearing in many of the leading Indian newspapers. This cure was exposed in a British Medical Association Report, and also attacked by *Truth*. The proprietor was sued by a widow, and the judge stated 'I think this is an intentional and well-considered fraud. It is a scandalous thing that poor people should be imposed upon and led to part with their money, and to hope that those dear to them would be cured by those processes which were nothing but quack remedies, and had not the slightest value of any kind'. A few years later the proprietor sued the British Medical Association for libel but lost the case, and the remedy then disappeared from the market, as one would have hoped, for good.

Another preparation which made similar claims is also re-appearing, although it suffered the same fate; its suppression was accomplished in a unique and dramatic fashion. It first came into popularity during the influenza epidemic of 1918, as an antiseptic; then claims were made for it that the dream of *Therapia magna sterilans* had at last been realized, and that three pints of it would cure the most advanced case of pulmonary tuberculosis or any other bacterial disease. These claims were supported by an extraordinarily intense advertising campaign, full-page and even double-page advertisements appearing in practically every leading periodical in England in the summer of 1924, which many will remember. Almost alone among the British press, the *Daily Mail* refused to accept the advertisements but, on the contrary, published a three-column article by Sir William Pope, Professor of Chemistry in the University of Cambridge, denouncing the claims made by the proprietors as fantastic, and stating that the name 'tri-methenal allylic carbide', which was assigned to the 'active principle', was meaningless, gibberish and was not the chemical definition of any known substance. He concluded that the preparation consisted of—

'about 1 per cent of formaldehyde;
about 4 per cent of glycerine;
about 95 per cent of water;
and lastly a smell'.

The last constituent was perhaps to be expected as the preparation was said to be made from garlic. He calculated that the materials contained in a gallon cost about 1s. 6d., and the mixture was sold at £4-10-0 a gallon.

As Professor Clark states, the exposure, which many of us will remember, was completely successful, and the matter is of historic interest in that it is the only example of the career of a proprietary medicine being arrested by the action of the popular press, a Saul, indeed, among the prophets. Sir William Pope's article in the *Daily Mail*, in which he dealt with the claims of the preparation to cure such diseases as phthisis and cancer and other diseases for

which medicine knows no radical cure, included the following striking passage:—

'Phthisis (consumption) and cancer are among the most common of the diseases which fall into this category, and the secret remedy finds its greatest commercial success when offered as a specific cure for these maladies.

'Many of our poorer families include one or more members suffering from some mortal disease, and the utmost affection and care are often lavished upon these invalids.

'It is pitiable to think that people of this class, reading the warily phrased advertisements of a secret remedy, interpret them as guaranteeing a cure for the sufferer, and waste the money that is required for the mere necessities of life on useless and even harmful rubbish'.

VI. *The attitude of the medical profession in India*

What should be the attitude of the medical profession in India to the constant stream of tendentious literature that fills the postman's bag and to the cleverly presented advertisements that appear in the public press, and those which, most of them, of course, ethically quite unobjectionable, occupy so many pages of our favourite medical journals? Even Dr. Alfred Cox, late Medical Secretary of the British Medical Association, was constrained to admit before the Select Committee of the House of Commons in 1914, that the censorship of advertisements in the *British Medical Journal*, which should be above reproach, was not as discriminating as it might be.

As a profession—and this should be a sobering thought—it seems that, from the advertiser's point of view, we are not much less suggestible than the laymen; and that in spite of years of scientific study and of the practice of our profession, which should develop the critical faculty, we are unable to offer much more 'sales-resistance' to modern advertising in this field than the general public. Should we not make a determined effort to assess the claims of advertisers, contending for our support, in a more critical and scientific spirit, and, in the financial interests of our patients (or, it may be, of those of Government, or other employers), if for no other reason, show a little less readiness to prescribe or indent for proprietary preparations until we are fully satisfied that the corresponding preparations in their simpler and much less costly pharmacopœial form will not serve our purpose equally well?

Is there not a lesson to be learnt, for instance, from what must be a very costly campaign which is raging between the Dutch quinine interests and the German synthetic drug industry, each seeking to prove, by the free distribution of sumptuously produced literature, that their own product is the best?

The main protection of the public from exploitation must lie with the Legislature, and it

is to be hoped that a measure will be introduced before the problem has developed to unmanageable proportions, as appears to be the case in England, but there is much that we as doctors can do, by example and precept, to limit the effects of the tide of fraudulent misrepresentation which disfigures so much of modern commercial activity in the field of proprietary medicines and dietetic preparations.

The power of the press, in India, either for good or evil, is naturally limited by the extent of the literate population, but the *Statesman*—

all honour to that journal—has lifted its editorial voice, the writer believes for the first time in the history of Indian journalism, against the evils of the quack medicine trade. Is it too much to hope that other newspapers in India will follow the example?

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Medical News

SUMMARY OF TUBERCULOSIS NEWS FOR THE MONTH OF DECEMBER 1938

Tuberculosis Health Visitors' Course

1. The first course for the training of female tuberculosis health visitors under the King George Thanksgiving (Anti-Tuberculosis) Fund starts from 16th January, 1939. Seventeen nominations were received through the provincial and state tuberculosis sub-committees, and ten candidates have been selected and will undergo training for six months at the Silver Jubilee Tuberculosis Hospital and Lady Reading Health School. Each candidate will receive a stipend of Rs. 20 p.m. with free furnished quarters. The employment and pay of successful candidates will be a matter entirely for the provincial anti-tuberculosis sub-committees who deputed them for the training.

King-Emperor's Anti-Tuberculosis Fund

2. The latest subscription list issued by the Honorary Treasurer shows that Rs. 66,84,515-7-5 were collected up to 13th December, 1938.

CONTROL OF DRUGS IN INDIA

EXISTING ACTS INEFFECTIVE

Stringent measures are needed to deal with the chaotic situation in regard to the profession of pharmacy in India and to the manufacture, sale and import of drugs in the British Pharmacopœia as well as those which are 'known and approved'.

The report of the Drugs Enquiry Committee in 1930-31 drew attention to the ineffectiveness of existing legislation to control the drug industry and prevent the sale of impure, adulterated and misbranded pharmaceutical products.

Mere adulteration of drugs is not, by itself, prohibited throughout British India by any enactment. Apart from the commission of the offence of cheating, adulteration which renders the drug 'noxious' or 'lessens the efficacy' or 'changes its operation' alone is controlled by the Indian Penal Code. Nor is the sale of a drug of insufficient strength or improper standard punishable otherwise than on the basis of misrepresentation and fraud. The non-existence of fixed standards or methods of analysis, the absence of any precise definition of adulteration, the difficulty of proof and the fact that intention or knowledge is of the essence of these offences, as well as of cheating, complicate the situation and render the provisions ineffective in practice.

In addition, false marks and false trade descriptions, the Marks Act and the Sea Customs Act merely touch the fringe of the problem of misbranding which is hydra-headed. Strict proof of difference in the nature or quality of the goods or the falsity of the description is often beset with impediments. The Cantonments Act is also of limited

scope and efficacy. The Indian Sale of Goods Act, 1930, which is merely concerned with obligations of a civil nature is also inefficacious in securing food and drugs of the opposite standard of strength, purity and quality.

As regards the profession of pharmacy, there are practically no restrictive laws of general application except certain perfunctory provisions in Municipal Acts of some of the provinces relating to the registration and licensing of retail shops and the employment of compounders.

VALUE OF INDIAN INDIGENOUS DRUGS

ONLY a very limited number of indigenous remedies deserve the reputation they have earned as cures and quite a large proportion of them are absolutely worthless and have probably crept in through tradition and folklore.

This is one of the results of an important research undertaken to investigate on scientific lines the claims of the rich materia medica of the Ayurvedic and Unani systems of medicine which was financed by the Indian Research Fund Association.

During the last twelve years this enquiry has done a considerable amount of work which has not only received local appreciation but international recognition. The Departments of Pharmacology and Chemistry of the School of Tropical Medicine, Calcutta, are now considered an authority on all questions in connection with the chemistry, pharmacology and therapeutic uses of the Indian indigenous drugs.

It has been found that many of the pharmacopœial drugs or allied species grown in India which could be used in the manufacture of pharmacopœial preparations are in common use.

SIXTEENTH ALL-INDIA MEDICAL RESEARCH WORKERS' CONFERENCE

VITAL problems affecting India's health were reviewed at the Sixteenth Annual Medical Research Workers' Conference which was opened by the Hon'ble Sir Jagdish Prasad, Member for Education, Health and Lands, in the Conference Hall of the Imperial Secretariat, New Delhi, on 12th December, 1938.

An unusually large number of medical and health interests were represented including administrative heads of Medical and Public Health Departments, distinguished members of the women's medical profession, representatives of the Indian States, military health services, railway medical organizations, the Rockefeller Foundation, the Indian Council of Agricultural Research, and others.

Remarking how grateful the Indian Research Fund Association and the delegates were to Sir Jagdish Prasad for finding time amidst his multifarious duties to be present, General Bradfield requested him to open the conference.

HONOURABLE KUNWAR SIR JAGDISH PRASAD'S SPEECH

'You have come here from various parts of India, some of you from the remote South, in order to apply yourselves to an extensive and formidable technical agenda', said Sir Jagdish Prasad addressing the delegates.

'Till last year this conference was held always in Calcutta and to some extent, therefore, functioned in a restricted orbit. I hasten to say, in deference to the feelings of any Calcutta person present, that I do not consider that great city a restricted spot in itself; what was in my mind is that the continued association of your conference with a single city in India had prevented the people of Northern India, for example, from having the aims and scope of medical research work in India brought more closely home to them. I think it has been a great benefit to have had it brought to Delhi, and I would be glad in due course if it could go the rounds of the main centres in India where those of your profession could conveniently gather and where they would find an appreciative local audience and co-operation. For the present, however, you are in Delhi and we are glad to have you here.

'I understand that it is no mere coincidence that during this week another conference is being held in Delhi, namely, that of the Association of Medical Women in India. A new and desirable innovation is that the delegates to the latter conference will be enabled to attend your morning sessions where they will have the benefit of listening to and taking part in your discussions.

'As you are probably aware, the Research Fund Association was founded in 1911 through the foresight of the late Sir Harecourt Butler, the first Education Member of the Government of India and one of the greatest Governors under whom it has been my good fortune to serve. He did many big things in a big way, and not the least of them was the foundation of this Association. Let us cherish his memory in grateful remembrance.

'The Association has produced one remarkable result during the comparatively short period of its existence', continued Sir Jagdish, 'namely, the training of a large number of Indian research workers of proved competence. Out of one hundred and six research workers paid by the Association no less than one hundred and three are Indians. In the Medical Research Department of the Government of India sixteen officers out of twenty-five are Indians. Research, therefore, is now predominantly in the hands of Indians, and they are the inheritors of a great tradition. Medical research in India has many achievements to its credit, specially the notable contributions it has made to our knowledge of kala-azar, malaria, plague and cholera. Prolonged research discovered the probable carrier-agent of kala-azar and produced a method of mass treatment which practically stamped out the disease in its chief home, Assam. The efficacy of our prophylactic anti-cholera and anti-plague vaccines is now generally recognized. Though much work of world-wide recognition has been done in regard to malaria, it is still one of our most formidable enemies and continues to take a heavy toll of life and to sap the energy of a vast number of our people. While we are proud of our achievements we cannot yet say, as for instance it can be said of England, that cholera, typhus, typhoid, plague, smallpox and malaria have been stamped out.

'There is still a wide gap in this country between the results of research and their successful practical application. Poverty, ignorance and prejudice among the masses, a certain scepticism as to the results of medical research among the educated classes, with a consequent absence of continuing pressure of public opinion on Governments for effective measures against diseases, are some of the many causes which seem to make India the prosperous home of so many human scourges. In no country, except perhaps China, is the need for continued research and its practical application so insistent as in this country where life is often an uninterrupted gamble in disease. The prevalence of such a distressing variety of deadly human ailments

in this country probably accounts for some of the deep pessimism and fatalism that pervades Indian thought. The sorrow and deep tragedy of life, rather than its joy and brightness, obsess the mind. Such an attitude numbs initiative and deadens the effort to make life worth living.

'In my view nothing is more likely to stimulate public opinion and to make it realize the extent to which organization under scientific direction can be effective, than the eradication or control of even a single disease in a specified area. If we can free even one infected town of, say, malaria, we will have made a great advance in the education of public opinion. From this point of view the intensive and hitherto successful campaign against malaria in Delhi is of more than local importance. It not only brings the results of research, as it were, from the laboratory to the market place, but, what is more important, it produces a healthy change in the attitude of the people in regard to the effectiveness of modern public health methods. I am sure that if we could say with confidence that we had completely freed Delhi of malaria and had made Simla safe for those who are now drawn there more by the force of circumstances than by reason of its reputation for salubrity, we should have done much to bridge the gap between medical research and its successful application to the lives of the people. We should have taken a big step forward to convince doubting men and women that there could be no more suitable object of public benevolence than the endowment of medical research.

'Without the aid of public benefactions I fear that, with our present financial resources, the provision for medical research must remain inadequate for many years to come. In comparison with Western countries our expenditure on research is meagre and there seems little prospect of improvement in this respect in the near future. At the same time I fully recognize that it would be short-sighted policy if violent budgetary oscillations were to result in throwing out of employment a number of workers engaged in important work and in the prime of their powers. Such a policy would indeed give a serious set-back to research in India and will, I hope, never find favour.

'While I am on this subject of research I should like you to remember that in a poor country like India it is not enough to discover a remedy. If it is to be widely adopted it must be within the means of the Governments and peoples to apply. To give an illustration, the efficacy of quinine in the treatment of malaria is recognized. We all know, however, that at present prices quinine can be used by only a very small fraction of the population. Research must, therefore, continue into remedies both preventive and curative which may be within the financial resources of the country. In India the research worker cannot ignore the economic conditions of the people for whom his researches are primarily meant.

'It will be generally admitted that some of the fundamental causes that produce ill health, such as poverty, overcrowding, defective sanitation and water supply, evil social customs and ignorance of the laws of health, are outside the immediate field of your work. Your primary concern is, I take it, with the causation, prevention and cure of human diseases. Your object is to save human life and to alleviate human suffering, in contrast to some researches in other realms of science where new discoveries seem to threaten the very existence of civilization as we know it.

'I do earnestly pray that no diabolical ingenuity may ever pervert the discoveries of medical science to the destruction of mankind. It is my earnest hope that by your continued researches you may place at the disposal of the men and women of this country and of their Governments powerful weapons with which to destroy the long and desolating supremacy of disease and preventable death in this country and to secure for the people of India the inestimable blessings of health and physical fitness.'

General Bradfield addressing the delegates said he joined with the Hon'ble Member for Education, Health and Lands, in extending to them all a hearty welcome

to Delhi. The holding of the conference in Delhi last year had to some extent been an experiment, but the general satisfaction expressed by the delegates had encouraged the Scientific Advisory Board to suggest Delhi for a second time. By the end of the week, a decision would have to be made regarding arrangements for next year. They had anticipated the desire expressed by Sir Jagdish Prasad to see the conference held in different large centres in India, for he understood that their fellow workers in Bombay and in Madras had already made certain suggestions in that respect. These would be considered before a final decision was reached.

WOMEN DELEGATES

Looking through the list of delegates, the Director-General said he had been struck by the wider number of medical and health interests represented as compared with earlier conferences. It was a great pleasure to have again the assistance of distinguished members of the women's medical profession, and a welcome innovation would be the attendance at their morning sessions of delegates from the Annual Conference of the Women's Medical Association of India, which was also being held in Delhi during the week. He felt sure that they would find many of the discussions both interesting and profitable.

Indian States were represented by ten officers of whom nine received a special training in nutrition survey work at the Coonoor Laboratories during the early months of the year. They were glad, continued General Bradfield, that the States in question recognized the importance of the Indian Research Fund Association and realized the benefits to be derived from making contact with its activities. He welcomed representatives of the Rockefeller Foundation whose presence indicated the continued interest which the Foundation took in the promotion of public health, and Mr. Knipe and Mr. Dyer, whose special knowledge of sanitary engineering in general and anti-malaria engineering in particular would undoubtedly be of great value to health administrators in this country. By their assistance in promoting measures for the improvement of the health of the rural population, the work of the Rockefeller Foundation had made a definite impression on the public health of India, which would, he felt certain, prove of lasting value to progress in that field.

MILITARY HEALTH SERVICES

The presence of representatives of the highly organized military health services reminded them, he stated, that the health problems of the military and civil populations in India converged so closely in many places that only co-operative action could ensure success. The necessity for that co-operation was well recognized both by military and civil administrators, and its further development would be discussed at the forthcoming meeting of the Central Advisory Board of Health.

The Indian Council of Agricultural Research, whose nutritional and other activities in the fields of agriculture and animal husbandry were so closely allied to their own, were represented this year by Mr. Kerr whom, said General Bradfield, they were glad to welcome particularly as that was the first occasion he had attended their conference.

The increased representation of the railway medical organizations on the occasion was gratifying to them all, and the Director-General assured Dr. Cairns and his colleagues that they welcomed their participation in the discussions. The railway medical organizations in this country were large and important and, as in the case of the military authorities, their co-operation in the field of public health was of vital importance.

The railway authorities had further contributed towards making the conference a success. General Bradfield referred to the generous action of the Railway Board in arranging that their delegates should be given the benefit of Christmas concession fares at a date considerably earlier than that on which these were ordinarily made available. This had enabled the

presence of a number of research workers who might otherwise have found it impossible to attend.

RESEARCH AND FINANCE

In discussing the affairs of the Indian Research Fund Association, its research activities during the present year and its plans for the coming year, he said he apologized if he had to open on a depressing note. But he felt it his duty to bring to their notice at once that, contrary to expectation, the financial position of the association, which had been a cause of anxiety to both the Governing Body and the Scientific Advisory Board for some years, had not improved. Since 1932 the activities of the association had been maintained at their present level only by drawing on capital funds, because the Government of India had been unable to give an annual grant larger than Rs. 1,50,000, compared with its previous grant of Rs. 7,50,000. It was hoped that this drain on the capital of the association would be appreciably reduced during 1938-39 by the Government of India undertaking responsibility for the Public Health Section of the Malaria Institute of India. Unfortunately, this hope had not materialized and the Governing Body had been compelled to draw further on its capital to the extent of Rs. 4,50,000.

These facts were mentioned, the Director-General continued, so that they would appreciate the necessity for close scrutiny of the proposals for next year's programme. After the unfavourable financial position revealed itself in April last, the Executive Committee of the Governing Body was compelled to consider whether some, if not all, of the newly sanctioned researches should not be cancelled. Any such step would have meant the postponement of important investigations, and would have resulted in disappointment to those workers who had convinced the Scientific Advisory Board of the merits of their particular proposals and who, in some cases, had already engaged their staff. The Executive Committee, therefore, came to the conclusion that whilst sanctioned researches should be allowed to continue, the officers in charge should be required to limit their expenditure to absolute essentials.

PROVINCIAL RESPONSIBILITY

The number of enquiries being conducted this year, explained General Bradfield, was 63 compared with 53 in 1937-38 and with an average of 38 during the five preceding years. Applications had been received for the continuation of 56 enquiries and for the inauguration of 22 new enquiries, or 78 in all. It would be necessary to examine every proposal with the greatest care, but the Scientific Advisory Board and the Governing Body would, as usual, give full consideration to their discussions and to the recommendations made by the conference.

The grants given during the present year, stated the Director-General, numbered 42 to laboratory enquiries and 20 to field enquiries. Nineteen of the enquiries were in medical colleges or schools. He drew attention to a matter which, he believed, was not as fully appreciated as it might be. Whilst the Indian Research Fund Association had always considered applications for grants from medical colleges, it should be remembered that modern practice assigned a definite responsibility for research, and more particularly for investigation into problems of local interest, to teaching institutions, which should be provided with the scientific equipment and staff to undertake them. As evidence of their active association and sympathy with the ideals of this conference they appreciated the attendance of a number of representatives of medical colleges, many of them old friends. Their research activities called for their sympathy, but they should also look for encouragement from the governing authorities of their own colleges and seek financial support from their Provincial Governments.

COMMITTEE'S REPORT

Referring to the committee of six which the Governing Body had set up to enquire into the conduct of medical research under the Indian Research Fund

Association, General Bradfield said that the sub-committee, after preparing a preliminary draft earlier in the year, had met last week to adopt the final form of its report to the Governing Body. All that it was possible for him to say at the moment was that the committee had taken a broad view of its terms of reference.

During the year six officers were recruited to the Medical Research Department, including one for special research in malaria. Four had already joined and the others were expected to do so shortly. The Director-General trusted that these new recruits would make every effort to maintain the high standard which had in the past characterized the activities of that Department.

In a resolution passed at last year's conference regarding the necessity for placing adequate and cheap treatment of malaria within the reach of the people, continued the Director-General, they noted that the Government had instituted an enquiry into the possibilities of extending the cultivation of cinchona in India. The report of the special officer appointed to conduct that enquiry was now in the hands of the Imperial Council of Agricultural Research. The completion of this enquiry was an important step towards ascertaining the possibility of making India self-supporting in the matter of its quinine requirements.

CHOLERA DANGER

General Bradfield made special reference to the question of cholera. The great danger, he said, which this disease continued to present in India was illustrated last spring when, as a sequel to the large melt held in Harwar, an epidemic broke out and spread over wide areas of the country. The administrative control of these outbreaks would be more suitably discussed at the Central Advisory Board of Health meeting which was to be held early in January. At this Research Conference they were more concerned with the efforts being made to elucidate the causes of such regrettable outbreaks and they would be able to assess the results achieved by the enquiries which had been in progress during the last five years.

Owing to the uncertainty which existed in regard to the relationship between the cholera vibrio and other vibrios, and in regard to the serological differentiation of different types, the International Office of Public Health in Paris had decided that special investigations on these questions were urgently necessary. As a result of earlier work, it had been made evident that many points could only be cleared up by research carried out in endemic and epidemic cholera areas and India was asked to undertake this work. Owing to the nature of the problem the work in India had naturally fallen into two phases, one laboratory investigation and the other conducted in the field. The phase of laboratory investigation had involved the collection and detailed examination of some thousands of vibrio strains from cases of cholera, from carriers and from water. Their work had proved that vibrios of many different types were widely distributed in nature, but by the adoption of new serological methods, the true cholera vibrio could now be differentiated from other types, whose presence in water supplies and human carriers had in the past led to much confusion.

FIELD INVESTIGATIONS

With a new and reliable basis for the diagnosis of the cholera vibrio and with more accurate knowledge of the distribution of other types the Director-General said they were now in a position to undertake on an effective basis the second phase of the enquiry, namely the field investigation of the factors concerned in the epidemiology of cholera and particularly those concerned with its persistence in certain endemic areas. The Cholera Advisory Committee would, therefore, be asked to discuss a proposal to terminate the enquiries of an essentially laboratory nature and to concentrate on field work in endemic areas such as were to be found in Bengal and Madras.

The work so far done had been undoubtedly productive and its value had been warmly appreciated

by the International Office of Public Health. The Cholera Commission of that body in its report of May 1938 recorded its acceptance of the findings made in India which had answered the questions put forward by them in May 1934. Throughout these investigations close association had been maintained with workers of the Medical Research Council in England and it was hoped shortly to present a full and co-ordinated account of this work.

NUTRITION

Turning to nutrition, General Bradfield said that further progress had been made during the year. A training course for health officers in public health nutrition work, including methods of carrying out diet surveys, was held at the Nutrition Research Laboratories, Coonoor, in February and March last. Fifteen officers attended, twelve being from Indian States and the remaining three from Delhi, Orissa and Sind respectively.

Satisfactory publicity had been given to recent work of practical value to India by the issue of a health bulletin entitled, 'The Nutrition Value of Indian Foods and the Planning of Satisfactory Diets'. To increase the circulation of the important information contained in this bulletin, the Government of India had agreed to issue it at the specially low price of two annas. Nearly 25,000 copies had been sold. An up-to-date and enlarged edition was in the press, and an important improvement, which made the bulletin of greater value to the layman, was the inclusion of Indian names for the different foods.

Last year the Nutrition Advisory Committee emphasized the finding that skimmed milk was of great value in improving the health and development of Indian children and recommended that milk powder containing not more than 4 per cent of fat should be exempted from customs duty. This recommendation, he said, had been accepted by the Government of India, so that imports of skimmed milk from Great Britain were now free of all duty whilst the duty on that from other countries had been reduced to 10 per cent.

The important Conference of Far Eastern Countries on Rural Hygiene held in Java in 1937 recommended the establishment of a National Nutritional Committee in each country. The Government of India had accepted this recommendation and had decided that the Nutrition Advisory Committee of the Indian Research Fund Association should perform the functions of a National Nutrition Committee for India.

The value of the work done under the auspices of the Association in the matter of nutrition and the high esteem in which the Association's Nutritional Laboratories at Coonoor were held by Eastern countries, had been indicated, continued General Bradfield, by a request from the League of Nations Health Committee that the Coonoor Laboratories should assume the task of co-ordinating nutrition research in the East. This request would come before the Governing Body for consideration at its next meeting. In March last, the Governing Body had given sanction to the acceptance by the Director of Nutritional Research of membership of the League's Technical Commission on Nutrition. During his leave this summer, Dr Aykroyd attended a meeting of this Commission.

MALARIA

Regarding their malaria organization, he stated that disappointment was experienced when the Government found it impossible for financial reasons to take over the Public Health Section of the Institute, an important element of which was the Field Experimental Station at Karnal. In 1936 this conference had recommended that the Experimental Station should be transferred from Karnal to Delhi at the earliest possible date. There were obviously desirable reasons for making such a move. In the first place, it brought this important field unit into closer contact with the general public and with irrigation and other engineers. Moreover, a valuable museum had been built up at Karnal, but its remote situation was a serious handicap to its

usefulness. The Government of India had agreed this year to give Flagstaff House in Old Delhi to the Association for housing the Field Experimental Unit and the transfer from Karnal to Delhi was now in progress. In addition, the annual malaria classes would in future be held in Delhi where the anti-malarial schemes now more or less completed would constitute an excellent demonstration of the value of anti-malarial schemes based on sound knowledge.

YELLOW FEVER

Last year he had made a brief reference to the danger of the introduction of yellow fever into India owing to the rapid development of air transport. On two previous occasions at these conferences General Graham, the late Public Health Commissioner, made a statement on the position as it then stood. An important part of their preventive organization was the arrangement under which the Sanitary, Maritime and Quarantine Board of Egypt not only kept them informed of the movements of suspected passengers proceeding to India but also took steps to destroy mosquitoes which might be present in suspected aeroplanes coming to this country. Colonel Russell had visited Egypt last spring and later in the conference would give them a description of the present epidemiological features of this disease and the preventive measures now taken in this country against possible introduction of infection.

After his visit to Egypt, Colonel Russell had also discussed the subject with representatives of air lines in London and later attended the May meeting of the International Public Health Office in Paris. He was able to present papers from Indian Research Fund Association workers on the following subjects: cholera, nutrition, quinine, post vaccinal encephalitis, the population problem, and tuberculosis. General Bradfield said they had been assured by the Director-General of the International Office in Paris that the papers contributed by India were received with deep appreciation, and there was no doubt that the prestige of their medical research workers stood high in international circles. That position could only be maintained by careful thought, sound judgment and hard work and the Director-General hoped that it might be possible to continue to show to the world in general that India and her research workers were determined to maintain their leading place in the field of humanitarian and scientific endeavour.

LEPROSY CONFERENCE

During the year an International Conference on Leprosy had been held at Cairo and India had sent seven delegates. The report of that conference went to show that the anti-leprosy work in India had been planned on sound lines. In September, an International Conference on Tropical Diseases, with special reference to Malaria, had been organized by the Dutch authorities at Amsterdam. The Government of India had sent two delegates, but unfortunately the international crisis in some measure detracted from what otherwise would undoubtedly have been a profitable and interesting meeting. The Government of India were also represented at the International Entomological Congress held recently in Berlin.

The Central Advisory Board of Health, he stated, would hold its next meeting in Madras on 9th and 10th January. Those who were concerned with maternal and child mortality would learn with interest that the special committee appointed by the Central Board to report on Maternity and Child Welfare in India had completed its task. Many of the administrative officers who were present would no doubt be present at the meeting in Madras and he recommended to their serious attention the Committee's report and the four memoranda which dealt with the other items on the agenda.

A PRIMARY CONSIDERATION

General Bradfield concluded by impressing especially on the younger workers that, when choosing a subject for research, they should always keep in mind the

importance of its applicability to the improvement of the health of the people in India. This must always be a primary consideration with the Scientific Advisory Board in making their recommendations to the Governing Body. Scientific research was a matter to which considerable importance was attached both by Governments and the public. Their deliberations last year were the subject of wide interest and the valuable contributions made by workers in India to knowledge of disease were given much favourable comment both in the press and elsewhere. He was confident that their discussions this year would be equally helpful and stimulating.

OVERCROWDING IN INDIAN MENTAL HOSPITALS

Overcrowding, with its implications of growing hardship to the patients and increasing difficulties for the institutions, is reported in India's mental hospitals. With increasing urbanization and education there is a greater demand that these patients should be cared for and that institutional treatment for the indigent mental patients should be a charge on the State.

At present there are only 17 mental hospitals in British India—three in Madras Presidency, five in Bombay Presidency, three in the United Provinces, two in Bihar and one each in the Punjab, Central Provinces, Assam and Sind. The province of Bengal has arrangements by which its mentally defective patients are admitted to the mental hospitals in Bihar. There are no such hospitals in Orissa or the North-West Frontier Province.

Among States, Mysore has a mental hospital at Bangalore, with accommodation for 183 males and 67 females, and Hyderabad has a small mental hospital in the central jail. A scheme for the construction of an up-to-date mental hospital has been sanctioned and the work is to be started shortly.

In the 17 hospitals in British India there is accommodation for 8,425 patients, but the number of patients actually confined in these institutions in 1936 was 11,792 of which 8,930 were males and 2,862 females. There was overcrowding in almost all the hospitals, but it was more acute in Madras, Bombay and the United Provinces. The demand for admission in some hospitals was so great that even criminal insanes had to be lodged in jails where there was no satisfactory arrangement for treatment.

Psychiatric clinics.—A greater part of the accommodation in the existing mental hospitals is occupied by incurable patients, and the only important advance made in recent years has been the organization of psychiatric clinics at medical teaching institutions in Bombay, Bengal and the United Provinces. No such clinics exist in the Punjab, Bihar, Central Provinces and Berar, Assam, North-West Frontier Province, Orissa, Baluchistan and Coorg. Funds are not available anywhere to provide adequate accommodation for mental patients, but whenever possible psychiatric clinics should be opened at the larger hospitals. Such clinics deal especially with the early curable cases and when combined with a neurology clinic often produce the confidence which attracts patients.

Mentally defective children.—Another pressing problem is the provision of separate institutions for the training of mentally defective children. In Madras a class of about 15 children, who were inmates of the Madras Mental Hospital, was formed in 1937 and instruction in sense training, simple story-telling, picture-drawing, etc., was given and facilities for excursions, outdoor games, amusements and certain simple cottage industries provided. In Bombay the training is given at the Byramjee Jeejeebhoy House for Children, Matunga, which is maintained by the Society for the Protection of Children in Western India. The children are taught on Montessori lines and the training includes classes on sewing, embroidery, raffia work and thread work. Mentally defective children in Bengal are treated at two private institutions.

No facilities for the training of such children exist in the United Provinces, the Punjab, Bihar, Central Provinces and Berar, Assam, Sind, North-West Frontier Province, Orissa, Baluchistan and Coorg.

Causes of insanity.—Among the predisposing causes of insanity, judged from the conditions of admissions during 1936, were mental and moral stress, business and domestic worries, addiction to drugs and drink, infections, previous attacks and hereditary predisposition. The largest number of cases was between the ages of 20 and 40. Out of a total of 11,798 cases of insanity in 1936, 839 were due to mental deficiency, 1,187 to maniacal depressive insanity, 1,919 to mania, 1,441 to melancholia and 2,195 to schizophrenia including dementia praecox.

BIRTH-CONTROL RESEARCH COMMITTEE OF VILE PARLE

THE Secretary, Birth-Control Research Committee of Vile Parle, has supplied the following information:—

The number of people who visited and sought advice at the Birth-Control Centre at 166A, Vincent Road, Dadar, Bombay, conducted by the Birth-Control Research Committee of Vile Parle, during the quarter ending 15th December, 1938, was 925 out of which 512 were males and 413 were females. This quarter completes the first year of the existence of this centre and the total number of people who visited during the period was 2,165.

THE INDIAN HONOURS LIST

2ND JANUARY, 1939

THE following are the names of medical men, and others, associated with medical institutions, in the Indian Honours List of date 2nd January, 1939. We offer them our congratulations.

Knighthood

Colonel A. J. H. Russell, C.M.E., R.H.S., I.M.S., Public Health Commissioner with the Government of India.

Colonel K. V. Kukday, C.I.E., I.M.S. (retired), Central Provinces and Berar.

C.I.E.

Major-General N. M. Wilson, O.B.E., I.M.S., Surgeon-General with the Government of Madras.

Lieutenant-Colonel J. B. Hance, O.B.E., I.M.S., Residency Surgeon in Mysore, Bangalore.

Lieutenant-Colonel G. Covell, I.M.S., Director, Malaria Institute of India.

Lieutenant-Colonel E. W. O'G. Kirwan, I.M.S., Professor of Ophthalmic Surgery, Medical College, Calcutta.

C.B.E. (Civil Division)

Dr. Charlotte Leighton Houlton, Chief Medical Officer, Women's Medical Service, India.

O.B.E. (Civil Division)

Miss Ethel Adelaide Douglas, Missionary doctor in charge, Lady Kinnaird Women's Hospital, Lucknow, U. P.

Lieutenant-Colonel K. R. K. Ayyangar, I.M.S. (retired), lately Director, Pasteur Institute of Southern India, Coonoor.

Major D. P. Bhargava, I.M.S., Professor of Surgery, Prince of Wales' Medical College, Patna.

M.B.E. (Civil Division)

D. C. Chakravarti, Esq., V.H.S., Bengal Medical Service, Professor of Clinical and Operative Surgery, Medical College, Calcutta.

R. T. M. Hayter, Esq., I.M.D., Assistant Director, School of Tropical Medicine and Resident Medical Officer, Carmichael Hospital, Calcutta.

Captain H. D. R. Zscherpel, I.M.S., Superintendent, Central Jail, Peshawar.

Kaisar-i-Hind Medal (First Class)

Mrs. Sivakamu, Principal Zenana Medical Officer, Bikaner State, Rajputana.

A. D. Miller, Esq., Secretary, Mission to Lepers, India, Bihar.

T. H. Somervell, Esq., in charge of the London Mission Hospital, Neyyoor, Travancore State, Madras.

Bar to the Kaisar-i-Hind Medal

(First Class)

Miss Ida Sophia Scudder, Principal, The Missionary Medical College for Women, and Superintendent, The Missionary Medical College Hospital, Vellore, North Arcot District, Madras.

Kaisar-i-Hind Medal (Second Class)

Miss Minnie Rodha Barlow, Assistant Surgeon, Women's Medical Service, Lady doctor in charge, Municipal Zenana Hospital, Dera Ismail Khan.

Miss Hellen Gregory, Superintendent of the Baptist Mission Zenana Hospital, Berhampore, Orissa.

Miss Anne Dorothy Lawrence, Matron, Jadavpur Tuberculosis Hospital, Bengal.

Miss Norah Aileen Williams, Matron, Ranchi European Mental Hospital, Bihar.

S. C. Dutta, Esq., Medical Practitioner, Bengal.

G. P. Phadke, Esq., Medical Officer of Health, Pandharpur Municipality, Bombay.

Kaisar-i-Hind Medal (Third Class)

Miss Gangubai Hadkar, Medical Practitioner, Broach, Bombay.

A. Majed, Esq., Bengal Medical Service, Superintendent, Bengal Vaccine Institute, Bengal.

K. K. Dutt, Esq., attached to the Purulia Leper Home and Hospital, Bihar.

G. G. Raikar, Esq., Private Medical Practitioner, Kalyan, Thana District, Bombay.

Sub-Assistant Surgeon Jemadar R. S. Shaker, I.M.D.

V. K. Waradkar, Esq., Private Medical Practitioner, Katta (Pendur), Taluka Malvan, Ratnagiri District, Bombay.

Rai Bahadur

Mr. B. B. Hazra, Civil Surgeon, Rangpur, Bengal.

Mr. K. B. Sen Roy, Civil Surgeon, Gonda, U. P.

Lala M. R. Sawhney, Clinical Assistant to the Professor of Ophthalmology, King Edward Medical College, Lahore.

Rai Sahib A. N. Sarkar, Lecturer in Midwifery, Patna Medical College, Bihar.

Mr. G. C. Bhaduri, Civil Surgeon (Officiating), Champaran, Bihar.

Mr. N. Chatterji, Assistant Director of Veterinary Services, Orissa.

Rao Bahadur

Major M. R. G. Mudaliyar, Civil Surgeon (retired), Madras.

Vaidyaratna

Pandit C. Misra, Chikitsaka Chaudamani, Ratnamala, Champaran, Bihar.

Khan Sahib

Mr. B. Hason, Medical Officer in charge of Feni Hospital, Bengal.

Dr. K. S. Shah, Superintendent, Punjab Vaccine Institute, Lahore.

Rai Sahib

Mr. N. L. Varma, Medical Officer in charge, Manohar Das Eye Hospital, Allahabad, U. P.

Pandit M. D. Tewari, Assistant Medical Officer of Health, Garhwal, U. P.

Mr. U. M. Gupta, Lecturer in Pathology, Patna Medical College, Bihar.

Mr. M. Das, Sub-Assistant Surgeon, Kanke Dispensary, Ranchi, Bihar.

a small movement of the head is required to raise the lower end of the face tent 10 cm. off the chest. Such a movement may result in very inefficient oxygen administration, especially with draughts such as are liable to occur around the bed of a patient with pneumonia. It is true that the patient might be told to keep his chin down, or that sufficient pillows could be inserted under his head to ensure the correct position, but how many patients with pneumonia or acute heart failure will keep their heads in one prescribed position? Furthermore, lateral movement of the head must also be limited to some extent. It might be thought that by lengthening the front of the face tent its efficiency would be increased. This may well be so, but it should be remembered that any such change will result in further limitation of movement. The only conclusion that can be drawn from these observations is that, with a restless patient, the efficiency of this method of giving oxygen will vary with the position of the patient's head. These remarks apply to the face tent in its present form.

Comfort.—The face tent is light and fairly comfortable. If the chin is kept down a slight sensation of 'stiffness' may be experienced, but we have never found this to be really objectionable.

Ease of operation.—If no effort is made to keep the patient's head in the correct position, the face tent requires little or no attention.

Economy.—At the recommended rate of flow of 6 litres a minute the cost is approximately 6d. per hour.

Co-operation.—The only co-operation from the patient that is required is that he should keep his head in the desired position. In our experience this is often too much to ask of a restless patient.

(2) *The wire frame face tent* (with walls of celluloid).—This presents no advantage over the celluloid face tent described above. It is not so comfortable and not quite so efficient.

(3) *The cardboard face tent.*—This was made by ourselves according to the instructions given by Argyll Campbell. Our workmanship must have been poor as it was found to be less comfortable and less efficient than the wire frame face tent.

(4) *The face tent with curtain.*—We have used a 4½-inch curtain attached to the wire frame face tent (with celluloid walls) exactly as described by Argyll Campbell. This curtain certainly increases the efficiency of the face tent. Furthermore there is no serious wastage of oxygen when the patient raises his head. (At a rate of flow of 6 litres per minute, the percentage of oxygen in the lungs of C. E. G. fell from 60 to 44 on tilting the head backwards.) The main drawback to the curtain is that even normal healthy individuals may find it very uncomfortable after an hour or two. With a rate of oxygen flow of 6 litres per minute we have found that after 5 minutes the air within the box contained 2.4 per cent of CO₂ and that its temperature had risen from 21.5°C. to 27°C. After 15 minutes the temperature had risen to 28.5°C. and the subject was conscious of both the CO₂ stimulus to respiration and of stuffiness of the air breathed. To prevent over-heating Argyll Campbell has suggested that the frame be covered with linen and soaked with water. We have tried this, with discouraging results. Moistening the tent does delay over-heating but after it has been worn for 15 minutes there is little diminution in temperature. This procedure may also add to discomfort by wetting the face. With patients our experience has been the same. The face tent with a curtain will seldom be tolerated for any length of time.

Summary.—The four types of face tent that have been investigated all present certain disadvantages. The efficiency of the celluloid face tent depends partly on the position of the head. A slight tilt of the head backwards may so reduce its efficiency that the patient receives a supply of oxygen which may be inadequate. This type of face tent is therefore only suitable for those patients who will co-operate sufficiently to keep

their heads in one prescribed position. With a curtain properly attached to the face tent these drawbacks are prevented, but the complication of discomfort is added.

THE NASAL MASK

The nasal mask, with its bag attachment, is fully described later. It is as efficient as the face tent with a curtain, but not quite so efficient as the Haldane mask. The alveolar oxygen can be maintained at 45 per cent with a flow of 3 to 4 litres a minute. In our opinion it is the most comfortable of all efficient methods of giving oxygen with the possible exception of the oxygen tent. The mouth and eyes are not confined and the patient can attend to his nose by lifting the mask; expectoration is not interfered with. It is inexpensive to buy and inexpensive to run. With oxygen flowing at 4 litres a minute the cost is approximately 4d. per hour. The only co-operation required from the patient is that he should not displace the mask, and this seldom occurs except in delirious patients. Should this complication arise it at once becomes apparent as the bag attachment no longer rises and falls with respiration.

Summary.—The nasal mask is an efficient, economical, and comfortable method for the administration of oxygen.

THE NASAL CATHETER

The nasal catheter has attained considerable popularity in oxygen administration. A No. 9 catheter is usually recommended and it should be inserted about 3 inches so that the tip lies in the nasopharynx.

Efficiency.—A flow of about 6 litres per minute is required to maintain 45 per cent of oxygen in the lungs.

Comfort.—There are patients with dyspnoea who do not object to a catheter in the nose but there are many who do. Much greater than the mechanical discomfort is the irritation of the mucous membrane where oxygen escapes from the catheter. Even if several holes are cut few patients fail to complain of discomfort if a flow of 6 litres a minute is maintained for more than an hour or two. With the flow distributed through two nasal catheters, sufficient oxygen to raise the percentage in the lung to 45 will seldom be tolerated. The generalization can be made that the nasal catheter, whether single or double, is usually only comfortable when insufficient oxygen is being given. This may not hold in the case of children in whom a flow of ½ litre per minute may be sufficient. At this rate of flow the catheter will probably be comfortable.

Ease of operation.—Once inserted the nasal catheter gives no trouble unless the patient refuses to tolerate it. Insertion of the catheter may not be so simple. In sensitive patients cocaine may have to be used. Insufflation of the stomach with oxygen has been described. With the catheter inserted too far the patient may swallow oxygen with the saliva or food, and serious abdominal distension may result.

Economy.—If the patient will tolerate a sufficient rate of flow it costs about 6d. per hour to maintain 45 per cent of oxygen in the alveoli.

Co-operation.—No co-operation is required from the patient except that he tolerate the method.

Summary.—The administration of oxygen by means of a nasal catheter seems a reasonable and simple procedure. Its simplicity is perhaps its main danger. If sufficient oxygen for an adult is given the catheter may not be tolerated, and it is so easy to reduce the rate of oxygen flow until the patient is comfortable. Under these circumstances the physician is merely deceiving himself if he believes that oxygen is being properly given.

THE NASAL TUBE

With a tube lying just inside the nostril oxygen can very easily be introduced into the respiratory tract. Numerous types have been devised, using either

one or both nostrils; the only essential difference is the method by which the tubes are held in position.

Efficiency.—The efficiency of the double or forked nasal tube is almost identical with that of the nasal catheter. Some workers have found the nasal tube to be somewhat better than the catheter, although it is difficult to understand how this can be so.

Comfort.—We have made extensive use of nasal tubes on all types of patients and have found that few complain of discomfort. If the rate of flow is more than 4 litres a minute the patient may complain of irritation of the nose.

Ease of operation.—If the tube remains in position no difficulty arises, but we have found it impossible to keep the tube in position for any length of time, except with the most co-operative of patients. One would have thought that a small piece of tubing would be easily retained within the nostril, but the slight irritation due to its presence tempts the patient to rub his nose. No matter how the tube is secured most patients will displace it. After a prolonged trial with many different methods the routine use of the nasal tube was abandoned for this reason.

Economy.—The nasal tube is quite economical and to raise the alveolar oxygen to 45 per cent costs about 6d. per hour.

Co-operation.—The only co-operation that is required is that the tube should be left alone. As has already been explained, this is too much to ask of most patients.

Summary.—The nasal tube is an ideal method of giving oxygen, except for the difficulty of keeping the tube in position. We know of no means whereby this technical difficulty can be overcome.

THE FUNNEL

The administration of oxygen by means of a glass filter funnel placed near the mouth is a time-honoured procedure, but it has been shown repeatedly that very little, if any, of the oxygen given ever reaches the lungs. If pressed tightly against the face the funnel may be more effective, but no patient will tolerate this procedure for as much as an hour.

CONCLUSIONS

(1) The indiscriminate administration of oxygen to any patient who is cyanosed and acutely ill is in part responsible for the conflicting evidence on the value of oxygen therapy. Oxygen should only be given when there is a reasonable expectation of relieving anoxæmia. Where cyanosis is due to localized consolidation or to localized collapse of the lung, it can seldom be relieved by oxygen. Where cyanosis is due to a generalized impairment of aeration or to an inflammatory process scattered throughout the lung, oxygen, if properly given, should relieve cyanosis.

(2) An adequate supply of oxygen is as important as the method used for its administration. This can be assured only by the use of a proper flowmeter. A pressure-reducing valve is also recommended.

(3) The most satisfactory methods for the administration of oxygen are the nasal catheter, the nasal mask, and the oxygen tent.

(a) The nasal catheter is often too uncomfortable for continuous use if oxygen is given in amounts adequate for an adult. In infants the catheter may be satisfactory.

(b) The nasal mask is efficient, comfortable, and inexpensive. It is usually easy to operate but occasionally difficulty is experienced in fitting the mask to the nose.

(c) The oxygen tent is comfortable and efficient. It is expensive to buy and to operate and requires more or less expert supervision.

(d) Only four types of face tent were given a trial, and recent modifications of this method may prove to be satisfactory.

An analysis of the hæmatological findings in 57 cases of anæmia in pregnant tea-garden coolie women, with special reference to the results of treatment

By L. E. NAPIER

and

D. N. MAZUMDAR

(Abstracted from the *Indian Journal of Medical Research*, Vol. XXVI, October 1938, p. 541)

AN examination of the blood of 25 males and 25 females showed a low standard of hæmoglobin amongst the so-called normal coolies in the population from which the cases are taken. The mean corpuscular hæmoglobin is also below normal. This is the common characteristic of coolie populations; the significance is discussed.

The cases investigated were provisionally divided into three groups as follows:—

A. *Hypochromic.*—There are in this group 26 cases: of these 7 are microcytic, 18 are normocytic and 1 macrocytic; of these 26 cases, (1) 16 (6 microcytic, 9 normocytic, 1 macrocytic) only received iron and responded to the treatment in varying degrees, (2) 5 (1 microcytic) had iron only and did not respond, (3) 4 had mixed treatment (all normocytic) and responded to treatment in varying degrees, and (4) 1 (normocytic) had mixed treatment and died.

B. *Orthochromic.*—This group consisted of 28 cases, (1) of these 18 (4 macrocytic and 14 normocytic) responded to treatment in varying degrees, (2) 7 died (6 normocytic and 1 macrocytic), and (3) 2 (both normocytic) did not respond to mixed treatment, and 1 received no treatment.

C. *Hyperchromic.*—The three hyperchromic cases were all macrocytic, and all responded to treatment with liver extract.

The response to treatment in these cases is discussed in detail and in 34 cases this is demonstrated by graphs. According to their response to treatment the cases are arranged into two groups, the iron-responding group and the marmite-liver-responding group which correspond very closely to the hypochromic group, and the orthochromic and hyperchromic groups, respectively. Certain ætiological, clinical and hæmatological features in the two groups are contrasted, and the special characteristics of each group summarized.

The ætiological factors in these two types of anæmia are discussed, and the important findings in a dietary survey that was carried out in conjunction with this enquiry are given. The following conclusions were arrived at:—

The population of pregnant tea-garden coolie women as a whole has a low level of hæmoglobin associated with a small pale red blood cell: conditioned iron deficiency, brought about by continuous blood loss from hookworm infection in the presence of a low iron intake, will account for this in part, but not, we believe, altogether, and we consider it possible that a low calcium and/or a low vitamin-C intake may be associated factors.

The anæmia amongst pregnant women can be divided into two groups, characteristically microcytic hypochromic and macrocytic hyperchromic, respectively; the former is an exaggeration of the anæmia in the normal population brought about by the extra demands of pregnancy, but the factors concerned in the latter are not quite so evident, though the response to treatment suggests—and a dietary survey does not negative the suggestion—that there is a relative deficiency in important food factors probably associated with the vitamin-B₂ complex, and other observations indicate that this deficiency is conditioned by the presence of the foetus with its extra demands for substances essential for hæmopoiesis (or less probably its toxic influence) and/or by a state of chronic malaria.

Whilst characteristic examples of each type of anæmia are seen, they seldom occur in 'pure' state and in the vast majority of cases deficiencies of both groups are evident and require rectifying.

"Typhoid Mary"

(From the *Lancet*, Vol. II, 19th November, 1938, p. 1188)

THE death is reported from New York of Miss Mary Mallon, a chronic typhoid carrier, famous as 'Typhoid Mary'. She reached the age of 70, living in a country cottage purchased for her by the State in 1923, and died from a paralytic seizure.

Suspicion that Miss Mallon was a carrier were aroused in 1904 when four fellow servants in the house where she was employed as a cook contracted typhoid fever. These suspicions were confirmed in 1907, when two members of another household for which she worked developed typhoid, one of the cases ending fatally. Actually outbreaks of typhoid fever occurring at varying periods after Miss Mallon's engagement as a cook are traceable as far back as 1900, and even then, as Ledingham and Arkwright have observed, the list compiled by C. A. Soper is probably not complete. It is noteworthy that Miss Mallon had been in her first place for three years before cases began to appear in the household. Subsequent household outbreaks in her employer's family or staff were traced in 1901, 1902, 1904, 1906 (twice), culminating in the 1907

incident, which resulted in Miss Mallon's forcible removal and isolation as a carrier for a number of years. It seems, however, that in 1914 she became a cook in a sanatorium and was again the source of an epidemic. After this she was isolated for nearly ten years, and then housed at the expense of the State. Miss Mallon was a faecal, probably a biliary carrier. Typhoid bacilli, so far as is known, were never isolated from her urine. According to C. H. Browning and his collaborators probably 2 to 5 per cent of all cases of typhoid fever become permanent carriers and in all countries where the disease is still comparatively common, as in the United States of America, they may constitute 0.1 per cent or more of the total population. They are, of course, a constant source of danger to the community in which they live, especially when engaged in the handling of milk or other foodstuffs. In England and Wales medical officers of health have no power to do more than forbid carriers to engage in trades which involve the handling of foodstuffs, but it is clearly of the utmost importance to detect and whenever possible segregate enteric carriers while measures are adopted for their treatment. According to Browning most of those who excrete enteric bacilli for as long as six months after the acute attack will continue to do so, and those who still excrete them after a year will not be cured spontaneously and are to be regarded as permanent carriers. The successful treatment of the chronic carrier, whether biliary or urinary, has hitherto been surgical. So far drugs, vaccines, and physical therapy have proved unavailing. It remains to be seen whether the sulphanilamide group of drugs affect this distressing condition.

Reviews

THE BRITISH ENCYCLOPÆDIA OF MEDICAL PRACTICE.—Under the General Editorship of Sir Humphry Rolleston, Bt., G.C.V.O., K.C.B., D.Sc., D.C.L., LL.D. 1938. Butterworth and Company, Limited, London. (To be completed in 12 volumes.) Sold in complete sets only. Cash price, Rs. 25 per volume. Also available on the instalment system at Rs. 10 per month. Price, Rs. 26-8 per volume. Only available from Messrs. Butterworth and Company (India), Limited, Calcutta. Volume VII. Pp. xxvii plus 718 plus 41

THIS volume includes subjects from hyperchlorhydria to leucorrhœa. It would seem that the original estimate of eleven volumes was optimistic, as at volume VII we are not half-way through the alphabet.* This volume is by far the fattest so far issued, but the actual number of pages is not far above the average. There are an unusually large number of plates.

The first chapter is by Professor Henry Moore of Dublin. The subject is discussed fully. There are some useful sample gastric analyses showing the curves in different conditions. There is also a chart by Ryle and Bennett that is seldom reproduced in full. It shows the analysis of fractional gastric tests of 100 normal persons of three degrees of normality. About 50 per cent have a very narrow range, never over 35 c.cm. or under 25 c.cm. during the most active period of acid secretion, that is, from one and a half to two and a half hours; for 80 per cent of cases the range is slightly wider; but if 100 per cent of normals are to be included the range is a very wide one ranging from achlorhydria to a maximum of 100 c.cm.—these latter presumably include people with what Hurst calls 'the hypersthenic gastric diathesis'.

One is reminded of the fact that experimentally dilute mustard oil will produce a gastritis in some experimental animals. Workers on epidemic dropsy should remember this.

The chapter on impetigo by Dr. L. Forman of Guy's Hospital is a very practical and useful contribution to a subject that enters the daily routine of most practitioners in nearly every country in the world. Mr. Kenneth Walker has written the chapter on impotence. This is a subject that assumes considerable importance in this country and his teaching is certainly applicable here. The ætiology of this condition is very complex and there is in a great majority of cases a strong psychological element. That nervous inhibitions can sometimes be overcome by a small dose of alcohol is no doubt very true, but the practical suggestion that the nervous bridegroom should take a glass of beer before retiring to the nuptial chamber, if followed, might lead to a transfer of the inhibitions to a fastidious bride.

A chapter on insomnia might so easily develop into a glossary of proprietary hypnotics, but Dr. Purdon Martin's contribution is not of this kind. A few hypnotics are named, but the subject has been dealt with in a much higher plane and it is a chapter that will be found very useful to the practitioner.

Intestinal obstruction is a subject of primary importance to both physician and surgeon. This chapter, contributed by Mr. N. L. Eckhoff of Guy's Hospital, is a well-balanced discussion, with of course numerous cross-references to other chapters where the various causes of acute and chronic obstruction are dealt with in greater detail.

The conduct of labour naturally calls for a textbook rather than a chapter: this has for all practical purposes been provided in the 177 pages, divided into 15 chapters, devoted to this subject. There are ten contributors to these chapters; they include Lieut.-Colonel Green-Armytage, who appropriately has written on labour in the tropics.

*Since this review was sent to press the publishers have announced that the work will be completed in 12 volumes.

Again tropical diseases have been well served. The chapter on leprosy is written by Dr. E. Muir; this ensures a masterly and practical treatment of this important disease. Kala-azar has been generously treated, being allowed 36 pages and a coloured plate. There is another chapter in this volume on cutaneous leishmaniasis in which a classification of the leishmaniasis is given: both these are written by Dr. L. Everard Napier. There is a good chapter on lathyrism by Colonel R. N. Chopra. There are thus in this volume, five chapters that are of special interest to workers in the tropics (and, incidentally, four have been contributed by present or past members of the staff of the Calcutta School of Tropical Medicine).

The same high standard set by the earlier volumes is maintained throughout this volume.

LEUKÆMIA AND ALLIED DISORDERS.—By C. E. Forkner, A.M., M.D. 1938. The Macmillan Company, New York (60, Fifth Avenue). Pp. xvii plus 333. Illustrated. Price, \$5.00

LEUKÆMIA is a common disease in this country. How common, it is difficult to say. In western countries, England for example, a large spleen attracts the immediate attention of the medical examiner and, if the enlargement is considerable, 'leukæmia' will immediately arise in his mind. In India, this is not so: he will first think of malaria, then kala-azar, and possibly he may subject the patient to a variety of treatments before their ill success makes him investigate the case more carefully.

This is unfortunate. The importance of making a diagnosis of leukæmia is far from academic. It is a very great 'negative' importance, as it will save the patient from many months of futile treatment. But it is more than this. Leukæmia can, one supposes, strictly be classed as an incurable disease, but to prolong life is perhaps more important and one can certainly do this in chronic leukæmia. Further, one can bring the patient back to a moderate state of health for this period of prolonged life.

The average textbook of medicine deals with leukæmia unsatisfactorily from a practical point of view and even chapters in books on blood diseases and in encyclopædias tend to be disappointing.

It is therefore with some feeling that we welcome this important book on an important subject. The book is a very careful review of the available literature on leukæmia by one who has made a special study of the disease over a number of years and has had first-hand experience in at least two countries, China and the United States of America. It is a critical review but the author does not force his own opinion, and his summings-up are fair and convincing.

It is unnecessary to describe the book beyond saying that it is a model monograph. Of its three hundred odd pages, over sixty are devoted to the bibliography which must be the most complete one on the subject in existence. There are a few useful coloured and other plates. Also a number of charts and text-figures.

The reviewer read the chapter on that comparatively new disease, but only new because it was not previously recognized, monocytic leukæmia, with particular interest. In it the author condemns the names 'reticulosis' and 'reticulo-endotheliosis' as applied to this disease, in no uncertain terms. His own table, quoted from another publication, differentiating the acute leukæmias will be found a valuable guide to hæmatologists (Why is this and every other table referred to as a 'figure'? And, incidentally, it is not on p. 278, as is stated when it is later referred to. A few mistakes like this suggest that the proof-reading was not done with the meticulous care that would have been appropriate to the author's high standard).

We can very strongly recommend this excellent monograph to teaching physicians, hæmatologists, and all others who are interested in this disease which is a very important one in this country.

L. E. N.

THE NEW INTERNATIONAL CLINICS.—Edited by G. M. Piersol, M.D. Volume II. New Series One (Old 48th). 1938. J. B. Lippincott Company, Philadelphia and London. Pp. xxx plus 315. Illustrated. Price, 50s. for 4 volumes. Issued quarterly. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta

THERE are a number of important and interesting articles in this volume of the *International Clinics*, but perhaps the most practically useful one is on sacro-iliac joint pain. This is a long chapter and is divided into three sections, the first on the finer anatomy of the joint, the second on its mechanics, and the third on the ætiology, diagnosis and treatment of pathological conditions of this joint. The treatment consists in manipulation, and not only is the case for this form of treatment well made out, but very explicit details for the procedures are given. Lower back pain is a very troublesome and obstinate condition and, if organic bowel and prostatic disorders are excluded, the sacro-iliac joint disease is probably the most common cause; it is therefore important to know how this condition may be cured.

Another interesting chapter is anthracotherapy, or the intravenous injection of carbon particles. The immediate reaction to casual perusal of this chapter is that of reading a quack advertisement, but one soon changes one's mind. The obvious sincerity of the writer has made the reviewer decide to give this treatment an early trial. It is not a panacea, but acts in such divergent conditions as herpes zoster, gangrenous appendicitis, articular rheumatism, acute gonorrhœa, lymphangitis, and furunculosis.

The article on lymphogranuloma venereum is distinguished by having a bibliography of 138 references; this alone establishes its value, though the references are not all directly referable to this disease.

Another useful bibliography will be found in Dr. Claude Forkner's chapter on the relationship of leukæmia and pregnancy, a very painstaking study.

Other practical and useful chapters are on mandelic acid treatment of urinary infections and on insulin shock treatment of schizophrenia.

SYMPTOMS AND SIGNS IN CLINICAL MEDICINE: AN INTRODUCTION TO MEDICAL DIAGNOSIS.

By E. N. Chamberlain, M.D., M.Sc., F.R.C.P. With a Chapter on the Examination of Sick Children.—By N. B. Capon, M.D., F.R.C.P. Second Edition. 1938. John Wright and Sons, Limited, Bristol. Pp. xi plus 435. Illustrated. Price, 25s.

Two issues of the first edition in the course of a year and a half and a second edition a year later, proves definitely the popularity and usefulness of this book.

The author has set forth in this volume what a medical student must learn when he enters the medical wards, viz, the method of obtaining a correct and relevant history of illness of the patients, the technique of physical examination and of eliciting physical signs; so that he may learn how to solve the problem of diagnosis. The author has dealt with these subjects in an attractive and interesting manner. The description of the methods of examination of the patient and of eliciting the various physical signs—usually accompanied by photographs or diagrams—cannot but impress the student. The short descriptions of the common diseases of the different systems have been included and will be of help to the students in diagnosis of the cases.

The descriptions of the various procedures in medical case-taking are adequate in most instances. A few of the sections, e.g., those dealing with the types of gait or speech in different nervous diseases, should have been more elaborate and the different features of the various types described in more detail.

The section of hæmatology should be brought more up to date. The classification of anæmias is unsatisfactory. The cells labelled as megaloblasts in the colour plate, showing normal and primitive red

blood cells, is an early normoblast. A description of the modern absolute standards of the red cells, viz, mean corpuscular volume, mean corpuscular hæmoglobin, and mean corpuscular hæmoglobin concentration, would have been much more useful than that of the method of determining the colour index as given, which is of doubtful value in determining the presence of hyper-, ortho- or hypochromia. The section dealing with clinical pathology and biochemistry should contain more details about some of the tests than mere mention by name, e.g., urea-clearance test, sedimentation rate of blood. Inclusion of colour plates showing malarial parasites and the common helminthic ova and protozoal cysts would be useful for students and practitioners in the tropics.

The printing and get-up of the book and the illustrations are excellent. The book will prove extremely valuable to the senior medical students and general practitioners.

P. C. S. G.

MIDWIFERY.—By Ten Teachers. Under the Direction of Clifford White, M.D., B.S. (Lond.), F.R.C.P. (Lond.), F.R.C.S. (Eng.), F.C.O.G. Edited by Sir C. Berkeley, C. White and Frank Cook. Sixth Edition. 1938. Edward Arnold and Company, London. Pp. xii plus 676. Illustrated. Price, 18s.

THIS widely-used textbook has, in its new edition, not only maintained its previous high standard but has in several particulars improved on it. Some of the earlier editions have to a certain extent been marred by excessive conservatism in dealing with recent advances. This feature has completely disappeared from the latest edition. Every section of the book is completely up to date. Written primarily for the student going up for his final examinations, this book will also appeal widely to the busy general practitioner because no words are wasted anywhere. He will also consult the book with complete confidence because the blending of the ideas of the ten well-known teachers precludes the possibility of being misled by any personal fads or prejudices.

Readers in India and other English-speaking tropical and subtropical countries will be disappointed that there is no reference to tropical diseases in pregnancy. The absence of such a section limits the usefulness of the book to a certain extent. There are teachers in London who could do justice to an appendix on this subject.

Apart from this there is little in the way of criticism to make, but the following few points are perhaps worthy of mention:—

In the treatment of vesicular mole, no advice is given for those difficult cases where the os is closed or nearly closed.

Mandelic acid is recommended in cases of pyelitis of pregnancy, but no reference is made to the fact that this substance causes great indigestion in pregnant women and in the reviewer's opinion is unsuitable.

In the section on mechanism of labour the authors make no mention that the head usually engages in the transverse diameter.

One feels too that undue stress is laid on the active removal of the remains of the ovum in incomplete abortion. It would have been worth mentioning that in a large proportion of cases good results may be obtained by expectant treatment consisting of injections of pitocin, etc., especially where surroundings are unsuitable for active treatment or other contra-indications exist.

However, such unimportant criticisms are but an indirect compliment and the authors are to be congratulated on the production of such an outstanding edition of what has become one of the leading textbooks on obstetrics.

G. P. C.

CLINICAL OBSTETRICS.—By A. L. Mudaliar, B.A., M.D., F.C.O.G. 1938. Oliver and Boyd, Edinburgh (Tweeddale Court). Pp. xi plus 819, with 204 text illustrations and 9 in colour. Price, 27s.

His present and past students all over India will welcome the written version of Professor Mudaliar's teaching, and they will not be disappointed. The book covers the whole field of obstetrics in a clear and concise manner. The special problems which are encountered in the tropics receive adequate attention, a thing not usually found in textbooks written primarily for readers in Great Britain and America. For this reason the book should prove popular with all practitioners of obstetrics in the tropics. The author does not hesitate to give his own personal opinion where relevant, and this tends to make the book more readable and interesting.

There are, however, several criticisms which one feels should be made. The chapters on contracted pelvis are arranged in a very confusing manner. One wonders if it is not a printer's error that the rather brief reference to Caldwell and Moloy's classification appears at the end of the chapter on 'Management of Labour in Contracted Pelvis' instead of being included in the chapter on 'Contracted Pelvis' in which the older classifications appear. This section is also marred by the surprising omission of any adequate mention of x-ray pelvimetry. Although x-ray pelvimetry is practised in all big centres giving very accurate results and a description is included in practically all modern textbooks of midwifery, yet this statement appears, 'Much work remains to be done to enable us to judge with any accuracy by radiograph alone the extent of contraction in flat and generally contracted pelvis'.

Nor can the section on 'Physiology of the Female Generative Organs' be called up to date. It contains no reference to the hormones of the ovary and pituitary. No practitioner can face the medically educated public of to-day without a complete knowledge of hormone therapy. The sketchy appendix which is devoted to this subject will not satisfy even the most uncritical. The importance of progesterone therapy in habitual and threatened abortion receives only the barest mention in this appendix, and this treatment is not mentioned at all in the relevant chapters. The units employed are not given, nor the doses.

The chapter on hookworm infestation during pregnancy is excellent, but the importance of blood transfusion in extreme cases is not stressed. In fact blood transfusions are not mentioned at all in this connection. This serious omission is to some extent atoned for by the appendix on transfusions. Here one would have liked to have seen a sphygmomanometer recommended as an arm-band round the donor's arm, since this detail makes all the difference where transfusion with citrated blood is used. In the description of the direct method using a special syringe, the author advises puncturing the radial artery of the donor. Such a drastic procedure is entirely unnecessary. A vein of the donor would be very much easier to handle, and hæmatomata are less likely to develop.

The statement that in cephalic presentations Roederer's obliquity (excessive flexion) causes distocia is dangerous teaching. Students who take this statement too literally may well be led to false conclusions. Most obstetricians will agree that excessive flexion is a result of distocia and not the cause.

Few will agree with the author when he recommends 5 minims of liquid extract of ergot in cases of threatened abortion.

There is no mention of carbon dioxide therapy in the treatment of asphyxia neonatorum. This is obviously an accidental omission since the reader is advised earlier to keep a cylinder of the gas in readiness.

However, the intention is not to belittle what is really a most excellent textbook in spite of the few

relatively unimportant points mentioned above. It is well bound, well printed and generously illustrated.

G. P. C.

THE ABNORMAL IN OBSTETRICS.—By Sir C. Berkeley, M.A., M.C., M.D. (Cantab.), F.R.C.P. (Lond.), F.R.C.S. (Eng.), M.M.S.A. (Hon.), F.C.O.G., V. Bonney, M.S., M.D., B.Sc. (Lond.), F.R.C.S. (Eng.), F.R.A.C.S. (Hon.), M.R.C.P. (Lond.), and D. MacLeod, M.S., M.B. (Lond.), F.R.C.S. (Eng.), F.R.C.P. (Lond.), M.C.O.G. 1938. Edward Arnold and Company, London. Pp. viii plus 525. Price, 18s.

No obstetrician, whether specialist or general practitioner in whose work midwifery plays an important part, can afford to be without this masterly book in whose 500 pages is packed an immense amount of concisely written information on all subjects with which the obstetrician may be confronted. Much of this information is to be found in no other textbook and has in fact been largely gathered from recent authoritative articles in various medical journals, seasoned with the great personal experience of the authors. The book has the advantage of not being cluttered up with chapters on anatomy, physiology, normal labour, etc., which must necessarily form a major part of any textbook meant for medical students. Neither do the ordinary obstetrical operations, with which all who practice midwifery are familiar, find any place in this book.

There is, however, one chapter which is not in keeping with the general standard of the book, i.e., the chapter on mental diseases written by Sir Hubert Bond. The author has contrived to make what is admittedly a difficult subject still more difficult by the use of very long and complicated sentences and by a wordy and diffuse treatment of his subject. One does not doubt that all the necessary information is present but few will have the patience to read it.

Apart from this it is difficult to single out any chapter for special mention. Readers in India will be pleased to find that tropical diseases are adequately dealt with although perhaps not in quite the same detail as most other subjects. The chapter on injuries and deformities of the newborn is especially thorough and complete.

A useful bibliography is given which will be valuable for those who wish to consult the original works.

G. P. C.

VITAMINS AND VITAMIN DEFICIENCIES.—By L. J. Harris, Ph.D., Sc.D. (Cantab.), D.Sc. (Mano.), F.I.C. Volume I. 1938. J. and A. Churchill, Limited, London. Pp. xiv plus 204, with 50 illustrations. Price, 8s. 6d.

This is the first volume of an important new series of books on the vitamins. This series is described as 'a comprehensive but concise review of modern knowledge about vitamins'. The first volume appears to justify this description.

The writer in his preface refers to the saying that there are two ways of learning a subject, one to read every book available and the other to write a book oneself. He prefers the second way, and the reviewer agrees with him. One's thoughts are liable to be loose, but to put them on to paper they must be pulled together and arranged; this is the only way to obtain a sure foundation from which to take the next step.

The trouble is that when anyone writes a book they always want to publish it: this is quite unnecessary and, as a general rule, the practice is to be deplored. We can, however, allow exceptions to this general rule and Dr. Leslie Harris has an undeniable claim to be included amongst these exceptions.

The first chapter is historical; it is one of the most difficult problems to do justice in the matter of assigning rights of priority to medical discoveries of the present day. The subject is best left to the

long-distance historian: not that we really believe that he gets a better view, but by that time nobody really cares and so no feelings are hurt. You can pick Gowland Hopkins, Funk, Holst, Grigns, Eijkman, or go back to Lind and Captain Cook, if you like, as the discoverer of vitamins. The author has given a very fair and open summary of the early history of our knowledge on vitamins.

The main subject of this volume is, however, vitamin B, the anti-beri-beri vitamin. The gross avitaminosis and the various degrees of hypovitaminosis, clinical, sub-clinical and problematic, are discussed. The incidence in different foodstuffs, the standard requirements, and the biological and clinical tests for this vitamin are reviewed and the important ones described in detail.

By way of concluding this review we will quote from the foreword by Sir Frederick Gowland Hopkins:

'In the present volume Dr. Harris has, I feel, attained to remarkable success in overcoming the difficulties inherent in his task. He is deeply versed in the literature of the subject and his own ample experience of personal research in its service fits him for a proper appraisal of the work of others. The result is a book of exceptional adequacy. Under the head of each known vitamin in turn available knowledge is clearly marshalled, and, so far as I can discover, only the unessential is left out.'

'I can strongly recommend the book to all students who desire acquaintance with the present position and outlook in the field of vitamins, and believe that the specialist will welcome an admirable summary of the facts available to-day and a bibliography fully up to date.'

THE FUNDAMENTALS OF INTERNAL MEDICINE.—By W. M. Yater, A.B., M.D., M.S. (in Med.). 1938. D. Appleton-Century Company, Incorporated, London and New York. Pp. xlv plus 1021. Illustrated. Price, 35s.

The title of this book led the reviewer to anticipate he was going to encounter something different from the usual run of books. In this he was disappointed because it is only an attempt to condense the whole of medicine including dermatology, tropical medicine and dietetics into 1002 pages. The result is little more than a medical dictionary without the advantage of the matter being arranged alphabetically.

The brevity of description may be appreciated if one records that diseases caused by protozoa and metazoa are dealt with in 17 pages in the chapter on infectious diseases, and diseases of the skin are described in 54 pages. Such brevity would perhaps be admissible if the information given were always correct, but one finds in the treatment of kala-azar the newer antimony compounds are dismissed with the sentence 'Even more powerful antimony preparations are stibosan and urea-stibosan'. Such a jumble of meaningless and incorrect names is almost incredible. In treatment of malaria all that is said of plasmodium and atabrin is 'If hæmoglobinuria exists, only small doses of quinine should be given until the urine is clear, but plasmodium and atabrin may be used'. In the treatment of hookworm infection all the drugs are mentioned but there is no warning against their toxicity, even of carbon tetrachloride, and the only treatment mentioned for tapeworm is oleoresin of aspidium.

Other sections such as those on diseases of the respiratory system, of the heart and blood vessels, and of the digestive system are possibly better done, but the reviewer's task is to discuss the book from the point of view of the Indian practitioner, therefore a few of the errors and omissions in treatment of some of the diseases he encounters daily are emphasized, and the final verdict is that this is not a book that can be recommended for students or doctors in tropical countries.

P. A. M.

THE TROUBLED MIND: A STUDY OF NERVOUS AND MENTAL ILLNESSES.—By C. S. Bluemel, M.A., M.D., F.A.C.P., M.R.C.S. (Eng.). 1938. Baillière, Tindall and Cox, London. Pp. ix plus 520. Price, 13s. 6d.

This is the second book, entitled *The Troubled Mind*, that has been published recently. Both books discuss the 'troubles' of the mind from an unorthodox standpoint, but that is nothing in the disfavour of either. Dr. Bluemel's book is remarkable for the huge number of case histories with which he illustrates each mental trouble that he discusses. In fact, there are really too many. The etiology of by far the greater number of the troubles cited is hardly touched on. Too little space is given to treatment, particularly to psychotherapeutic treatment. The index contains no reference to psychotherapy and only to psycho-analysis where the author disparages it. The best chapter in the book is that entitled 'The Public Lunatic'. It deals almost exclusively with modern dictators, reformers, evangelists and miracle workers. Mental hygiene and prophylaxis are not touched on.

A TEXTBOOK OF CLINICAL PATHOLOGY.—Edited by Roy R. Kracke. Baillière, Tindall and Cox, London. Pp. 567, with 31 coloured plates and 205 diagrams in black and white. Price, 27s.

This is a volume which contains the accumulated experiences of a dozen teachers of the different medical schools of the United States of America. The editor is of opinion that it is not possible to write a book single-handed which will be comprehensive of all the laboratory methods and their interpretation. It is for this reason that he has secured the services of experts who are engaged in teaching these subjects to their students for many years. The editor does not want this book to be intended as a guide to the various laboratory methods but as an aid to the interpretation of results and their application to clinical medicine. We fully agree with the author that 'it is far more important for students of medicine to know the significance of achlorhydria than the technique of its determination', particularly in view of the fact that most of the laboratory tests are carried out nowadays by non-medical assistants. In every subject, one standard technique has been elaborately described and fully illustrated, thus lessening the task of the clinical pathologist. Every branch of clinical pathology has been included, viz, the examination of blood, serum, sputum, urine, stool, cerebrospinal fluid and material for virus infections and each one of the subjects has been dealt with in the most practical way. In fact it will not be exaggeration to state that even a beginner will be able to manage his work satisfactorily with the help of this book if he is placed in charge of the clinical laboratory of any modern hospital. The book is full of well-selected diagrams which have been specially chosen to illustrate the crucial points in the various clinical examinations. A short but useful bibliography has been attached at the end of every chapter for the benefit of those who intend to know further details about any subject.

It is difficult to make an unfavourable comment on a book of this nature. The reviewer would, however, be happy if, instead of only 2 pages, more space were given to the preparation of culture media. In some places, brevity has been observed at the cost of clarity and occasionally there has been some diversion to theoretical discussion which would have been better avoided in a textbook of clinical pathology.

This admirable book is recommended to every student, general practitioner, and laboratory worker for constant reference.

M. N. D.

A TEXTBOOK OF PATHOLOGY.—Edited by E. T. Bell, M.D. Third Edition. 1938. Henry Kimpton, London. Pp. 894. Illustrated with 412 engravings and 2 coloured plates. Price, 42s.

With the advancement of medical science as a whole, the scope of pathology is no longer confined to

the study of morbid anatomy and morbid histology alone. In every branch of modern medicine and surgery accurate diagnosis is always the aim which is attained by the thorough understanding of the abnormal physiological conditions prevailing at any particular phase or aspect of the disease.

Professor Bell and his colleagues of the University of Minnesota have very ably succeeded in producing a textbook for medical students which meets the requirements for this basic knowledge. The planning of the chapters is highly commendable in so far as it takes the student through all the aspects of the various diseases—common, uncommon, and rare—and, instead of the stereotyped description of the pathology and morbid histology of a particular diseased condition, one is pleasantly surprised to find the most up-to-date information on subjects like genesis of tumours, virus diseases, blood diseases, neuropathology, etc., dealt with in accordance with the present-day trend of modern and accepted scientific thought.

Pathological physiology is the basis of medicine and the authors may be said to have attained the almost impossible task of putting this highly technical subject in a very lucid and palatable form. Of the 414 illustrations a very large percentage is reproduced from photographs of actual cases and specimens in the collection of the authors and the drawings are mostly original—which gives the book a high scientific status indeed. After a careful study of the volume one cannot but testify to the just claims of the authors that the student will learn to look upon 'clinical medicine as a direct continuation of his pathological studies and not an abrupt entrance into a new field'.

CLINICAL ALLERGY DUE TO FOODS, INHALANTS, CONTACTANTS, FUNGI, BACTERIA AND OTHER CAUSES, MANIFESTATIONS, DIAGNOSIS AND TREATMENT.—By A. H. Rowe, M.S., M.D. 1937. Baillière, Tindall and Cox, London. Pp. 812, including Appendix and Bibliography. Price, 37s. 6d.

This useful volume deals with the nature, mechanism, clinical manifestations, diagnosis and treatment of the allergic conditions at some length. In addition to a consideration of the well-recognized manifestations of allergy such as asthma, hay fever, gastro-intestinal allergy, allergic dermatoses, etc., many conditions which may possibly be allergic in nature have been discussed. Of the latter conditions a very interesting one is allergic toxæmia giving rise to symptoms such as fatigue, exhaustion, lack of energy, depression, etc. Food allergy plays a most important rôle in the production of these toxæmias, although the seasonal toxæmias may be due to pollen or other inhalant allergens. The diagnosis and treatment of these allergic toxæmias is carried out on the same lines as of other allergic manifestations.

The author advocates the use of stock respiratory vaccines in the treatment of patients with asthma, in order to raise their immunity to severe head colds and bronchitis. This raised immunity, according to the author, would benefit the patient in two ways. Firstly, 'the bronchial infection secondary to the asthmatic attacks from some type of allergen are less likely', and secondly, 'with less likelihood to such infection, the allergic balance of a patient which ordinarily may suppress mild food or pollen sensitization is not upset'. It is difficult to understand the use of stock respiratory vaccines for prevention of head colds when the evidence at present available points to these 'colds' being caused by a filterable virus. There is no evidence at all that 'colds' can be caused by any of the members of the respiratory flora and as such there is no *a priori* reason for a vaccine from one or more of these organisms acting as a prophylactic against colds. Extensive clinical trials with these vaccines have failed to show any protective value against colds. The use of stock vaccines for prevention of bronchitis is also difficult to understand when we take into account the enormous numbers of antigenic

types of such members of the respiratory flora as streptococcus and pneumococcus, each antigenic type being immunologically specific.

D.

MALARIA IN THE NETHERLANDS.—By N. H. Swellengrebel and A. de Buck. 1938. Scholten and Holkema Limited, Amsterdam-G., Rokin 74-76. Pp. viii plus 267. Illustrated. Price, DFL. 5

THE authors apologetically present their offspring to god-parents, the world over, but they think that an account of its conception and development in relation to the simple conditions pertaining to the Netherlands must prove instructive elsewhere to malarialogical obstetricians.

They say that in the Netherlands the number of variable factors in the malarial constellation are so few that, for the elucidation of the incidence of the disease, there is presented a field of observation comparable with that of a laboratory experiment, and so they call their book 'a pocket-edition' of malarial epidemiology. One may say at once that the hypothetical pocket bulges with treasure, and if indeed the picture that the authors unfold illustrates a sunnier syndrome than that in other countries, God help these!

The fact is that one is astounded by the intricacy of the matter that has been here so untrivially unravelled. The successive chapters present the facets of the picture; man and not the mosquito serving as host of the parasite during the inter-epidemic season, malaria not to be eradicated but controlled to some extent by drugs, the single human habitation the focus of the epidemic, and so on and so forth, one canvas after the other portraying an exemplary analysis of the experimental field and of their field experience.

One should not here go into any further detail but nevertheless reference will be made to one point. It will be remembered that Ronald Ross pointed out that the incidence of malaria in a community was not correlated with the number of gametocyte carriers, that the only factor determining the issue was the number of anophelines. He specifically stated 'whether everyone or only one person is infected to start with the ultimate result will be the same'. His teaching, one would have thought, would have attracted some notice, but has been disregarded by writer after writer even by those considered to be authorities: these have sought to give such a factor as the immigration of gametocyte carriers an important place in the epidemiology of the disease and have even based malaria control entirely upon this doctrine. It is therefore of interest to read in this book (page 250) of infection being imported by immigrants but terminated by its failure to keep anopheline infection going; the interest of the matter being that there is something in conformity with Ross' thesis.

These successive chapters amply justify the object of the essay and it is not too much to say that it is a picture of the most brilliant piece of epidemiological work that has ever been accomplished.

It is a lesson indeed to those parochial-minded scientists in India who have been heard to maintain that 'surveys' are so little science that they can be given over derogatorily to the provinces to support, little appreciating that Nature is an open book for those who will to read and in so far as they are fitted to understand, and forgetting the arch-surveyor Darwin for these let the laboratory method provide their only pride, whereas let the contemned be proud of a profession that can nurture the begetters of such a picture as this.

C. S.

THE SEASONAL PERIODICITY OF MALARIA AND THE MECHANISM OF THE EPIDEMIC WAVE.—By C. A. Gill, M.R.C.P. (Lond.), M.R.C.S. (Eng.), D.P.H., D.T.M. & H. (Eng.), Colonel, I.M.S. (Retd.). 1938. J. and A. Churchill Limited, London. Pp. xi plus 136. Illustrated. Price, 10s. 6d.

WE admit that malaria is a seasonal disease and that its periodicity varies with climate and country, but

we cannot always account for the underlying causes, apart from the fact that life-habits of mosquitoes may play a part. Again, when we attempt to explain the sudden epidemic waves we find ourselves all the more lost.

Dr. Gill has reviewed all the available literature from different countries to bring fresh light on the problem and put forward a provisional explanation based on what he calls the relapse factor. He has given an instructive analysis of the European types of seasonal prevalence; the features of the North Indian type of epidemic and the Ceylon epidemic have also been dealt with.

The book is full of facts, and every malmiologist should go through it.

R. C.

ARTHRITIS, FIBROSITIS AND GOUT: A HANDBOOK FOR THE GENERAL PRACTITIONER.—By C. W. Buckley, M.D. (Lond.), F.R.C.P. (Lond.). 1938. H. K. Lewis and Company, Limited, London. Pp. viii plus 153, with 14 plates containing 24 figures. Price, 7s. 6d.

THE literature on rheumatic diseases is enormous; yet the whole subject seems to be shrouded in a fog, while treatment furnishes the most lucrative field for quackery of every kind. The differentiation and nomenclature of the conditions commonly grouped together under the designation 'rheumatic' still furnishes the ground for differences of opinion which only bewilder a general practitioner.

Dr. Buckley should be congratulated for bringing out this little book which is very complete, practical and readable. It dispenses with the historical and controversial matter as far as possible, and gives a clear and concise picture of the various disabling conditions of articular origin with reference to aetiology, pathology, clinical picture, diagnosis and treatment.

After an introductory chapter the book deals with rheumatoid arthritis, chronic villous arthritis, osteoarthritis, spondylitis, fibrositis and gout. The modern therapeutic measures have been fairly discussed. There are radiological plates illustrative of various conditions, and a short bibliography has been included at the end of the book.

The book can be thoroughly recommended to the general practitioners for the management of the unfortunate sufferers.

R. C.

CLINICAL ROENTGENOLOGY OF THE DIGESTIVE TRACT.—By M. Feldman, M.D. 1938. Baillière, Tindall and Cox, London. Pp. xvi plus 1014. Illustrated. Price, 45s.

THIS is in many ways an epoch-marking work on diseases of the alimentary tract. It covers the whole tract from the oesophagus to the rectum, and embraces every aspect of the subject including clinical, surgical, and pathological points of view. In other words, it gives a complete summary, culled from the author's experience and study of all important writings on the subject, of our present knowledge of the radiological aspects of gastro-intestinal diseases.

The style is lucid, reproduction of skiagrams excellent, and arrangement of subjects logical. There are sections on the gall bladder and pancreas which after all are offshoots of the intestinal canal.

In addition, under the heading *Miscellaneous* are grouped the radio diagnostic aspects of abdominal conditions not directly connected with the digestive tract.

Another distinctive feature is the large number of references at the end of each chapter. These embrace all the important writings on the subject-matter of the chapter; so it forms a complete work of reference not only for the specialist, but also for the general practitioner, on account of the correlation of the radiological picture with clinical and pathological findings.

The material is presented in 220 chapters profusely illustrated with x-ray pictures and drawings all artistically reproduced.

This is a work which should find a place on the shelves of every radiologist, physician and surgeon interested in the diagnosis of diseases of the gastrointestinal tract.

J. A. S.

THE CHEMISTRY OF THE STERIDS.—By Harry Sabotka. 1938. Baillière, Tindall and Cox, London. Pp. xiii plus 634. Illustrated. Price, 38s.

THE book supplies us with a much-needed monograph on sterols and steroids. The author traces the history of their investigation up to the beginning of the nineteenth century and from that time up to the beginning of 1937 he gives references to all relevant literature. There was much confusion as to nomenclature in the older literature and he has given us the new and more rational names along with the older ones. The earlier chapters deal with the traditional methods of structural research, with the newer ones of selenium dehydration, thermic cyclization, etc. The formation of the reaction product has been explained in the light of the accepted cyclopentenophenanthrene structure. There is a chapter on steric considerations. This portion of sterid chemistry is still incomplete but the problems have been discussed in a clear manner and there are some useful suggestions. The chemical and physical properties of bile-acids and choleic acids, which are of great biological interest, have been treated in two chapters and there is a list of choleic acids known up to date. The sterols, hormones, cardiac glycosides, carcinogens, and sapogenins are treated in a separate chapter with short notes and references to original literature. The last chapter deals with the different colour reactions used in biological assays. The synthetic side of sterid chemistry has not, however, been dealt with in this book. There are numerous tables of physical and chemical properties of similar compounds for comparative study and the theoretical chemist will have enough classified data collected and sorted on which to base his theories.

A large bulk of the book, from page 176 to page 496, is devoted to a classified catalogue of all sterids and their derivatives, with their structural formulae, systematic designations, physical constants, occurrence, formation, chemical reactions, transformations, etc., from all sources available up to 1st January, 1937. The bibliography comprises most publications of chemical and biochemical interest on bile acids, sterols, and other sterids which have appeared before 1st January, 1937, and the last few pages are devoted to the graphic formulas of many of these compounds.

The book is the first of its kind to present a connected and comprehensive account of the work done up to date. It will thus be very useful not only to biochemists and advanced research workers but also to all those interested in the biologically active natural products like sex-hormones, antirachitic vitamins, carcinogenic agents, cardiac glycosides, etc., and will form a valuable addition to all scientific libraries.

S. G.

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES, NO. 231. 'REPORT ON RADIUM BEAM THERAPY RESEARCH, 1934-38'.—By Constance A. P. Wood, L. G. Grimmett, T. A. Green and others, under the Direction of the Governing Body of Radium Beam Therapy Research. Published by His Majesty's Stationery Office, London. 1938. Pp. 77. Illustrated with text-figures and coloured plates. Price, 4s.

'THIS report records the results of four years' research into the treatment of cancer by means of the rays from a large mass of radium situated at a distance from the patient, in contradistinction to the more usual type of radium therapy in which much smaller amounts of radium in suitable containers are inserted by a surgical operation directly into the tissues, or, in the case of superficial tumours, are applied directly

to the skin. The method here described is known as "radium beam therapy", or "telerradium therapy", and it was first developed in France, Belgium, the United States, and more extensively in Sweden'.

'During the first four years of the inquiry, the use of this method of treatment has been restricted to cases of cancer of the mouth, tongue, pharynx and larynx, which are relatively accessible to radium therapy and in which, by reason of the superficial sites of the growths, the local effects of the irradiation may be readily observed. Most of the patients referred to this treatment have been in an advanced and inoperable stage of cancer, and it will be seen from the report that the results have been encouraging. The number of patients so far treated is too small for any statistical comparisons, but it is believed by those well qualified to judge that the results obtained by radium beam therapy compare favourably with those to be expected from surgery. Moreover, these results have been obtained without any mutilation of the patients. On the other hand, it is necessary to mention that the patient with cancer undergoing radium beam therapy cannot expect to escape a period of some discomfort during and immediately after the treatment; such discomfort appears to be almost inevitably associated at present with the exposure of the tissues to massive irradiation'.

'Of even greater importance than the actual therapeutic results so far recorded are the new technical methods which have been elaborated as the result of close co-operation between physicists and clinicians, and which are described in careful detail by the investigators concerned. The procedures used in this research, both for the treatment of patients and for the protection of the staff, should be applicable not only to radium beam therapy in its further evolution; they should be widely adaptable also to the needs and future developments of other types of radiotherapy for cancer'.

This is a valuable report illustrated with a number of figures and some good coloured plates. No one interested in the subject can afford to neglect this authoritative report.

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES, NO. 232. 'MEDICAL USES OF RADIUM. SUMMARY OF REPORTS FROM RESEARCH CENTRES FOR 1937.' 1938. Published by His Majesty's Stationery Office, London. Pp. 48. Illustrated. Price, 1s.

'THIS report—the sixteenth in a yearly series—summarizes the research done with radium or radium emanation during 1937 at some twenty hospitals or other institutions, most of which hold radium on loan from the Medical Research Council. The main scheme of work is under the general supervision of the Radiology Committee, to whom the Council are indebted for the preparation of these annual summaries'.

'The research described is partly experimental and partly clinical. The experimental section deals with laboratory investigations both of the physical aspects of radiations and of the effects of gamma rays on proteins and living tissues. The clinical sections describe new technical methods used for the radium treatment of cancer and some non-malignant conditions; and they include statistical data on the results obtained in patients treated in 1937 and earlier years'.

WALL CHART AND CODE FOR LUNGS EXAMINATION.—By H. N. Chatterjee, B.Sc., M.D. (Cambridge, Mass.). Published by P. T. Hall (India), Calcutta. Price, Re. 1-8

IN this chart the author has set forth the methods of clinical examination of the lungs, and its physical signs, and a code for recording the findings (the latter, by the way, is taken from a chart by Dr. Samuel Gee). The list of 'apparatus' (*sic!*) the author wants the student or the practitioner to obtain in order to examine the lungs and the throat is quite formidable: no less than eight items are needed, *viz.* stethoscope, spirometer, cyrtometer, bronchoscopic set, laryngoscope,

chest measuring tape, Mackenzie's diaphragmatic polygraph and concussion pleximeter.

The author has given a long list of 'apparatus', but almost all the physical signs he has enumerated can be elicited by ordinary methods of examination, using less than half the things he has mentioned.

The description of normal and abnormal physical signs is ill-written, and contains half truths and misconceptions. The word 'apex' has been spelt as 'appex' in three different places.

It is difficult to see what useful purpose can be served by this chart.

Abstracts from Reports

ANNUAL REPORT ON THE BERRY-WHITE MEDICAL SCHOOL, DIBRUGARH, FOR THE YEAR 1937-38

It will be recalled that when Major-General Sir Cuthbert Sprawson, Director-General, Indian Medical Service, visited the school and hospital in 1935 he enquired into the staff, equipment and teaching facilities at the school, and embodied the result of this enquiry, together with corresponding data from 27 other medical schools in India, in a tabular statement, which presented the teaching facilities of the various medical schools, not only in relation to each other, but also in relation to an absolute standard, which was defined by the application of certain rules.

The most important deficiencies then noted were:—

The shortage of teaching beds and the low daily average of in-patients in relation to the number of students;

the shortage of staff, particularly the school staff, and to a less extent the hospital staff, and as a consequence, the allocation of the teaching of more than one subject to various teachers;

the lack of clinical material for the teaching of midwifery and gynaecology; and

the want of a sufficient number of microscopes for the teaching of physiology, pathology and bacteriology.

Since the issue of Sir Cuthbert Sprawson's note, substantial progress has been made in remedying some, at least, of the deficiencies, though the standard of the school is still below the average standard of medical schools in India, and falls very far short of the absolute standards, laid down for an efficient medical school by Sir Cuthbert Sprawson.

Considering the several deficiencies referred to above:—

The number of sanctioned beds has been increased from 109 to 131 and the daily average of in-patients has increased from 88 to 98. It is doubtful whether any further increase in the number of sanctioned beds is justifiable, even if funds were made available, as if provided they would be likely to remain empty for the greater part of the year. It would appear that as a result of the establishment in recent years, of well-equipped hospitals in neighbouring tea-gardens, and elsewhere, the number of beds provided is already in excess of the demand, and the disproportion between the student-entry and the number of teaching beds can only be adjusted by reducing the number of annual entrants, a restrictive measure which Government have so far been unwilling to adopt.

The shortage in staff has been reduced by the appointment of a whole-time non-medical teacher of chemistry and physics, and a whole-time teacher of hygiene and medical jurisprudence (an assistant surgeon). This arrangement enables the teachers of anatomy, of medicine and of surgery to restrict their teaching to their proper subjects.

The lack of clinical material in midwifery which, at the time of Sir Cuthbert Sprawson's enquiry, was the most glaring deficiency of all, is now somewhat less apparent: there were in 1934-35 no more than 14 labour cases; in 1935-36 there were 27 and in the year under report 46. This figure is still less than a tenth of the 'standard' number, but the increase is at least encouraging, and is largely due to the opening of the Narsingdas Jallan Maternity and Gynaecological Ward.

The number of gynaecological cases showed a similar gratifying increase.

The shortage of microscopes for teaching purposes has been largely met by the purchase, last year, of 20 new microscopes.

The long list of badly-needed improvements awaiting provision of funds is sufficient evidence of the difficulties under which the school is working and the hostel accommodation for students falls very short of a proper standard; the rooms provided are so cramped and small that serious study must be very difficult, and as there is no separate common room reserved for private study they have therefore no alternative but to use their own huts for the purpose.

The Superintendent, Lieutenant-Colonel C. H. P. Allen, I.M.S., and his staff are to be congratulated on a useful year's work, carried on under conditions which in many respects are makeshift and unsatisfactory for want of adequate funds, adequate teaching material, and adequate accommodation—circumstances which combine to make the measure of success attained the more praiseworthy.

VISWA-BHARATI BULLETIN NO. 25. INSTITUTE OF RURAL RECONSTRUCTION, SRINIKETAN. HEALTH CO-OPERATIVES. BY RATHINDRANATH TAGORE. PRICE, As. 2

This small publication is issued by the above association established some years ago under the presidentship of Sir Rabindranath Tagore, for the mental, moral, and physical improvement of villagers in the Birbhum District of Bengal.

This bulletin gives an account of the public health needs in village communities and how these are being met in a few specially selected villages. At present it is only in the experimental stage, but the results already achieved appear remarkable, and if the principles being instilled into these few villages prove successful and are extended to others the ultimate benefit to the country as a whole should be immense.

The pamphlet does not lend itself to abstraction, but we recommend it to all local government bodies for perusal in the original.

ABSTRACT OF ANNUAL REPORT ON THE RESULTS OF RADIOTHERAPY IN CANCER OF THE UTERINE CERVIX. SECOND VOLUME. EDITED BY J. HEYMAN, STOCKHOLM. LEAGUE OF NATIONS HEALTH ORGANIZATION, GENEVA

The present volume is the second of the series of annual reports on the results of radiotherapy in cancer of the uterine cervix issued by the Health Committee of the League of Nations.

The first annual report, published in 1937, referred to cases treated in 1930 and previous years; the second report includes statements referring to cases treated in 1931.

All five collaborators in the first annual report have submitted statements for the present report and the second report includes three additional collaborators, viz:—

(7) Memorial Hospital for the Treatment of Cancer and Allied Diseases, New York, United States of America (Dr. William P. Healy).

(8) Woman's Hospital in the State of New York, United States of America (Dr. George G. Ward).

(9) Institut du Cancer, Paris, France (Dr. Simone Laborde).

The statements provided by these nine centres vary considerably in respect of the number of years to which they relate and of the number of patients treated yearly in each centre. When all the data included in them are combined, they furnish information concerning 6,570 patients suffering from cancer of the uterine cervix who were examined with a view to treatment, of whom 5,672 (86.3 per cent) were submitted to radiological treatment.

The following tabular statement shows the results obtained after the lapse of five years from the date of treatment:—

		Per cent
Alive without recurrence ..	1,491	26.3
Alive with recurrence (including those operated upon after failure of radiotherapy) ..	102	1.8
Died of cancer ..	3,901	68.8
Died of intercurrent diseases ..	113	2.0
Lost sight of ..	65	1.1
TOTAL ..	5,672	100.0

The 5,672 patients treated were allocated to stages as follows:—

		Per cent
Stage I ..	607	10.7
Stage II ..	1,626	28.7
Stage III ..	2,417	42.6
Stage IV ..	1,020	18.0
Unclassified ..	2	0.04
TOTAL ..	5,672	100.0

Results of treatment calculated for each of the four stages:—

	Number of patients treated	Alive without recurrence	Relative cure rate, per cent
Stage I ..	607	335	55.2
Stage II ..	1,626	590	36.3
Stage III ..	2,417	512	21.2
Stage IV ..	1,020	54	5.3
Unclassified ..	2	0	0.0
GRAND TOTAL ..	5,672	1,491	26.3

The inverse relationship between the proportions of patients allocated to, and cured in, the different stages will be noted.

The patients examined with a view to treatment, but not treated, may be considered in two classes, viz:—

(a) Not treated owing to some condition of the patient such as extent of the disease, general health, or other complication.

(b) Not treated owing to some other reason such as lack of hospital accommodation.

The data needed to divide the whole sample of untreated cases (898 in number) into these two classes have not been recorded; they are available, however, for 198 cases untreated during the years 1930 and 1931, and show that 29 (14.6 per cent) fell into group (a) and 169 (85.4 per cent) into group (b).

The advisory committee invites attention to the steps taken in 1937 to secure greater uniformity in the allocation to stages of cervical cancers and to the definitions of the four stages, namely, the 'Atlas on the division of cancer of the uterine cervix into four stages according to the anatomo-clinical extent of the growth', edited by J. Heyman and published by the Health Organization of the League of Nations. The atlas, which contains 38 diagrams illustrating examples of

the cases to be allocated to each of the four stages, was published in March 1938. It may be obtained on application to the Publications Department of the League of Nations, Geneva, Switzerland.

The committee expresses the hope that the simplified definitions and illustrative diagrams of the atlas will enable experienced clinicians to stage in a reasonably uniform manner those cases in which thorough examination enables the extent of the growth to be precisely determined.

No reference has been made in the report to the possibility that such differences as exist between the cure-rates of co-operating clinics may be related to the methods of treatment used in those clinics. The committee is convinced that consideration of such matters is of small value at present and that it is not yet practicable to assign to differences in methods of treatment, differences in the cure-rates obtained. Work of this kind must be postponed until there is greater certainty that factors, other than the actual treatment used, which are liable to vitiate the reliability of cure-rates stated numerically, have as far as practicable been eliminated. The elimination of such other possible causes of differences in cure-rates constitutes the primary object of the committee's work in its present phase.

The committee renews its invitation made in the first annual report to directors of clinics, and others who are interested in this subject, to communicate with the Chairman, Prof. J. Heyman, Radiumhemmet, Stockholm, with a view to participation in future reports.

BULLETIN OF THE HEALTH ORGANIZATION. VOLUME VII, NOS. 1, 2 AND 3. ANNUAL SUBSCRIPTIONS (6 NUMBERS) 15s.; \$3.75, POST FREE

THE number of Bulletin of the Health Organization of the League of Nations issued in February 1938 contains three articles. The first is the eighth annual review of Reports from Pasteur Institutes on the Results of Antirabies Treatment, by Lieut.-Colonel A. G. McKendrick. The second study deals with field experiments in malaria treatment and prevention carried out in Rumania with synthetic drugs. The third article (by K. Stounnan) deals with an experimental application in the city of Brussels of a system of 'health indices', the purpose of which is to measure the state of health in a given community.

The second number of the *Bulletin* is entirely devoted to the teaching of hygiene, on the basis of a study tour carried out at the end of 1936 by Professors Jameson (United Kingdom), Pittaluga (Spain), and Stampar (Yugoslavia).

The text of the report made by them is given. After a general study of the factors influencing the development and work of the Institutes and Schools of Hygiene in Europe, it describes the principal types of institutes, the recruitment of students and professors, and the organization of the courses. There follow certain general observations on the work of these institutes: full-time service, compulsory training of medical officers, training in hygiene of medical students and graduates, relations with social-insurance institutions, etc. As an annex there is given a detailed description of Institutes or Schools of Hygiene at Ankara, Belgrade, Budapest, Cluj, Jassy, London, Madrid, Nancy, Prague, Rome, Sofia, Warsaw and Zagreb.

The *bulletin* opens with a report on the work of a meeting of Directors of Institutes and Schools of Hygiene which was held from 22nd to 27th November last, mainly to consider the report of Professors Jameson, Pittaluga and Stampar.

The third number of the *Bulletin*, contents of which reveal the wide scope and variety of the work of the Health Organization, includes the report of a committee of experts which was asked to work out a method of assaying the content of morphine in opium and of cocaine in raw cocaine and coca leaves that

would meet the practical requirements of a system of international control over the manufacture of narcotics. It also contains the latest report of the technical commission on nutrition, a report by another group of experts on the problem of insulation and lighting in relation to housing and town planning, and reports on three technical investigations—one into undulant fever in France, another into the significance of cocaine as a habit-forming drug, and the third into the comparative value of certain reactions for the sero-diagnosis of syphilis.

The report on assaying the content of morphine in opium and of cocaine in coca leaves is a further stage in the research work undertaken by the health organization at the request of the committee on the traffic in opium and other dangerous drugs. This report is of a technical character.

The report of the nutrition experts is also of general interest because of the full summary which it gives of the results achieved in investigations on a question which is attracting more and more attention, not only of health administrations, but also of the public. This report describes the state of knowledge concerning the requirements of the human organism in various nutritive elements, including vitamins, and especially during the first year of life. One chapter deals with milk, a foodstuff of the first importance, which must be prevented from becoming the vehicle of infection. Another discusses methods of carrying out surveys on nutrition and on the nutritional conditions of populations, which are essential if any progress is to be made in practical work.

The article on insulation and lighting gives a résumé of the conclusions reached by a special sub-committee of the housing commission of the health organization.

Similar studies have already been made and a report published on the question of noise, cold and heat, etc., in relation to housing.

Enquiries will also be undertaken on urban and rural planning, the abatement of smoke, water supplies, etc.

PROGRESS REPORT ON THE SCHEME OF RESEARCH ON QUALITY IN CROPS WITH SPECIAL REFERENCE TO RICE. DEPARTMENT OF BIOCHEMISTRY, INDIAN INSTITUTE OF SCIENCE, BANGALORE. By DR. A. SREENIVASAN, M.A., D.Sc., A.I.C.

A SUMMARY of this interesting and stimulating report of the work done at Bangalore is given below:—

Parboiled rice.—1. A very large part of the essential nutritive constituents—proteins, minerals and fats, of the husked (unpolished) rice grain—are concentrated in the outer layers, so that the process of polishing which has now become a prevalent practice even in countryside operations of rice pounding and milling, makes the rice almost entirely devoid of nutritive qualities. There is a steady decrease in the percentages of these constituents with milling. The complete removal of the bran layers in the grain results in the loss of about 25, 30 and 60 per cent, respectively of proteins, fats, and minerals.

2. Parboiled polished rice contains somewhat more of nitrogen and phosphorus than raw rice polished to the same extent, provided, however, the rice is not polished to a high degree. At the same time, the difference in composition between raw and parboiled rices is not very much, so that it would appear that the recognized superior quality of parboiled rice is in reality due to its being usually consumed in an under-milled state and to the fact that less of nutritive constituents are lost by the ordinary process of washing and cooking. Analyses of a large number of bazaar samples of raw and parboiled (milled) rices have shown that parboiled rice is less polished than raw rice. The extent to which parboiling preserves the vitamin B₁ and together with it the other essential nutritive constituents of rice on polishing would depend

on the variety of rice and, in particular, the thickness of its bran layer and the extent to which the rice has been parboiled.

3. Parboiling results in a high increase in the yield of head rice on milling. The optimum conditions of parboiling, such as time of steeping, temperature of steep water, time of steaming or boiling and pressure of steam as also the mode of drying, which result in maximum improvement of milling quality have been determined. The improved milling quality on parboiling is a distinct item of advantage to the miller especially when the soft, the *kar* or short-duration and the long-grained varieties, which are known for their poor milling qualities, have to be marketed.

4. The superior milling quality of parboiled rice together with its generally observed high nutritive and antinutritic value (due no doubt to its being milled to a lesser degree than raw rice) should make the production and use of this article more extensive than has hitherto been the case. Parboiled rice even on polishing has a slight yellowish colour. The nature of the factors contributing to the colour of the parboiled grain has been studied and, in the light of the observations, it can be stated that it should be possible, by using certain methods and equipment well suited to the preparation of good parboiled rice, to obtain a product with minimum discoloration.

Chemical composition.—5. There is considerable variation in composition between individual varieties. In particular it has been observed that coloured and coarse-grained varieties of rice contain larger amounts of protein and mineral matter than the fine ones. They also possess very much thicker bran layers, so that, even on milling, the extent of loss of nutritive constituents from such varieties which are considered inferior is less than with the superior varieties under ordinary conditions.

6. The possibility of increasing the protein and mineral contents of the rice grain by judicious control of fertilizer applications has been indicated from analyses of rice grown under different manurial treatments.

There is a great need for popularizing the consumption of unpolished rice, especially from coloured and coarse varieties. Such rices often compare favourably with wheat which has held a place of pre-eminence among cereal foods.

Keeping quality.—7. The factors affecting the keeping quality of rice have been determined and it has been shown that the poor keeping quality of unpolished rice is essentially due to the rice oil contained in the embryo and the outer integuments of the grain. It is possible, by suitable control of humidity and storage methods, to prevent or, at any rate, greatly minimize the deterioration of hulled rice on storage, but further efforts should be made to improve the keeping quality so as to be readily applicable in practice. Parboiled rice has got much better keeping quality than raw rice, even when unpolished.

Fumigation of rice.—8. Disinfection of rice consignments with sulphur dioxide appears to affect the quality of the product although not to a considerable extent. Such rice cooks to a pasty condition and the cooked product has a distinct acidic taste. Some of the factors that control the ill-effects of fumigation have been studied.

Digestibility.—9. The rate of starch hydrolysis in the different varieties of rice, both raw and parboiled, increases with increased polishing. Rice bran has a definite, though small, inhibiting action on the activity of the digestive ferments. The lower *in vitro* digestibility of unpolished rice may not be of great significance in practice. Parboiling results in partial dextrinization of the rice starch so that under ordinary conditions, where proper penetration by the enzymes is ensured, such rice is more easily digested than raw rice.

Storage of rice.—10. Freshly harvested rice cooks to a pasty condition and storage improves the swelling capacity of the grain on cooking. The different methods of storage as affecting the cooking quality of

rice have been studied and, in future work, attempts should be made to hasten storage by suitable treatments.

11. The changes in the amylases of the rice grain during ripening and storage have been followed and the possible bearing of these results on the storage changes are being investigated. The nature of the changes in rice starch as a result of storage is also being studied.

Nutritive value of rice varieties.—12. From results of extensive feeding experiments with different rice varieties using young rats and pigeons, it has been shown that growth is essentially correlated with composition, particularly protein and mineral contents of the rice samples. Coloured and coarse varieties induce better growth in animals, on account of their higher protein and mineral contents. One of the factors determining growth rate appears to be the level of protein supply and in this connection it is important to determine the supplements needed to make rice a wholesome diet. The availability of the different constituents of rice and the means of increasing them are under study. The effect of parboiling and of polishing on rate of growth with young rats is also being followed.

13. The chemical composition and nutritive value of rice varieties grow under (1) irrigated, transplanted, (2) irrigated, broadcast, and (3) dry broadcast conditions have been studied. Dry cultivated paddy has been shown to be least nutritious compared to wet cultivated rice. Irrigated broadcast rice is intermediate in composition and nutritive value between the dry and wet cultivated rice.

GENERAL CONCLUSION

It is generally argued by dietetic experts that rice is a poor article of diet and that it is not possible to alter its food value appreciably. It has even been suggested that rice should, in part at least, be substituted by some other cereal like wheat. In the present investigations, it has been shown how it is possible under certain conditions to enhance greatly the nutritive value of rice as ordinarily consumed. Thus, although the fine and the white varieties of rice are generally favoured by consumers, it has been found that some of the coarse-grained and coloured varieties contain larger quantities of protein and mineral constituents, particularly phosphorus, calcium and iron. Again, the losses in nutritive constituents as a result of washing prior to cooking of rice is not generally recognized so well and may be quite considerable especially when reckoned with the losses on polishing. Although washing with water removes adhering dirt from the grain, it is generally resorted to often only with a view to obtaining a whiter product on cooking; it should therefore be possible to avoid this wasteful process by adopting some system of dry-cleaning such as sieving and winnowing. There is great need for educating the public in regard to (a) the use of unpolished rice especially from coloured and coarse varieties known to be rich in essential nutritive constituents and (b) changes in ordinary cooking practice which will result in minimum loss of these constituents.

It is possible, by proper fertilizer applications, to enhance the nutritive value of rice, by enriching its protein and mineral contents, sometimes to the extent of 20 per cent. There is need for research to be directed on co-operation with breeders, towards the development of grains which are naturally rich in composition and have a high nutritive value.

Rice is a crop of the country and a very large number of good yielding varieties have been evolved at the different breeding stations. The farming practices are very familiar to the agriculturist. Rice protein has a high biological value, higher than that of wheat and, as indicated above, with certain varieties, its composition compares favourably with that of wheat. Attempts should therefore be concentrated on improving its general quality.

SOME PROBLEMS OF PRACTICAL IMPORTANCE, FOR IMMEDIATE STUDY

Rice varieties from different parts of India, which are naturally rich in composition, should be examined for their general nutritive value. In view of the fact that coloured and coarse grains are more nutritious, this observation should be extended and confirmed with a large number of rice varieties from all over the country. The types of rice of high nutritive value which can be grown under different soil and climatic conditions should also come in for detailed study.

Having chosen varieties with high nitrogen and phosphorus contents attempts should be made to increase its food value still further by suitable manurial applications. Preliminary observations have shown that under certain conditions the composition of the grain can be enriched to the extent of 20 per cent, but further work on this is necessary.

Since the present work has shown that the nutritive value of rice is essentially related to its protein and phosphorus contents, work should be undertaken with a view to comparing and improving on the quality of the proteins of rice varieties. There is also need for studying the influence of nitrogenous manuring on the composition and nitrogen distribution of the proteins of the grain.

A large part of the phosphorus in rice is present as phytin which, as has been shown by a number of recent investigators, is ordinarily unavailable to the human system. There is no doubt, however, that the culinary practices greatly influence the availability of the phosphorus compounds. The ratio of calcium to phosphorus in rice is also very low and hence supplements of calcium in the form of vegetables and other food articles will also favourably influence phosphorus assimilation. The extent of availability of the phosphorus compounds in rice under different conditions and means of increasing the same will have to be studied in detail.

Evidence obtained already would show that nutritive value is determined more by composition than by the duration of the crop. Further examination of a large number of long and short duration crops should be made with a view to verifying this observation.

Again, contrary to the popular belief and the evidence adduced by McCarrison, it has been shown that dry cultivated rice is nutritionally inferior to irrigated rice. It is necessary to extend and confirm these observations with other varieties and over extended periods.

Unstored, freshly harvested rice is unfit for consumption as it cooks to a paste and is not easily digested. Preliminary work has shown that it is possible to hasten artificially the period of storage necessary before the rice could be made fit for consumption. The nature of the factors responsible for improved cooking quality and digestibility on storage should be examined further with a view to evolving a practical method of hastening storage changes.

The main feature which distinguishes rice from most other cereals is that it is predominantly consumed in the milled state. Although unmilled rice does not find favour among consumers chiefly on account of its unattractive appearance, yet the real difficulty in regard to its use is that it has a very poor keeping quality. Hulled rice in the unpolished condition undergoes rapid deterioration with the development of off-flavours on keeping. The exact nature of the changes on storage should be studied in detail and the conditions determined under which unpolished rice can be stored in practice without deterioration. Such a study will be of great economic value and help to popularize the consumption of unpolished rice. There is evidence to suggest that parboiling improves the keeping quality of rice even in the unmilled condition, but further work is essential.

In this connection, it will also be highly desirable to devise cheap and efficient hand-hullers which can be used continuously without appreciable wear and in small households.

ANNUAL REPORT ON THE WORKING OF THE RANCHI INDIAN MENTAL HOSPITAL, KANKE, IN BIHAR, FOR THE YEAR 1936. By LIEUT.-COL. J. E. DHUNIBHOY, M.B., B.S., I.M.S., SUPERINTENDENT

The hospital continues to receive patients from the Provinces of Bengal, Bihar and Orissa.

The sanctioned accommodation of the hospital is for 1,013 males and 272 females. The 50 additional emergency beds, sanctioned by Government in 1929 to relieve overcrowding in the male section, having been found insufficient, it was proposed to increase the accommodation by another 14 beds, and the Government were pleased to sanction the increase by another 14 beds from the 1st October, 1936.

The apparent increase in the daily average number of sick patients treated during the year 1936 as compared to 1935 and 1934 is due to the general increase in the hospital population during the year under review and not due to any increase of illness.

The number of mentally defective children is steadily going up and in the absence of a separate children's ward it is becoming increasingly difficult for the administration to house and treat such children. During the year under review a very inexpensive scheme for the conversion of one of the existing spare occupational therapy buildings in the female section into a children's ward was placed before the managing committee of the hospital for approval. It was unanimously accepted by the committee and the final sanction of the Government to the scheme is now awaited. A mental hospital is not a fit place for treatment of certified mentally defective children and in the absence of proper homes for mentally defective children as well as of the Mental Deficiency Act for India, the magistrates have no other alternative but to admit them for treatment in the mental hospitals. It is therefore clear that some measure of reform is badly needed in this direction.

The care and treatment of insane to-day in a modern mental hospital can only be fully appreciated by a comparison with conditions which existed in the one time old asylums of India. A visit to the Ranchi Indian Mental Hospital cannot fail to convince an unbiased person of the complete hygienic and favourable conditions which exist. A modern mental hospital is a self-contained unit and in its communal life the patients find everything they need and no effort is spared to make their daily lives as happy, comfortable and contented as is possible having regard to the distressing mental conditions from which many of them suffer.

As stated in previous reports 'Occupational therapy' is and always will remain a sheet-anchor of our treatment. Under its beneficial influence noisy and turbulent wards of the hospital are fast disappearing and a number of hypnotic draughts given at night is considerably reduced. A brief outline of work done in Occupational Therapy Classes of this hospital is given below:—

Weaving, carpentry, smithy, cane and bamboo work, painting, tailoring, embroidery and lace work, gardening, shoe-making and mending, joss-stick-making, etc.

Besides, several patients are employed in the kitchens of both the sections and wards to help in cooking and general ward work.

Last year also when on leave I visited all the best known centres on the Continent and England. I am glad to be able to state that the 'Occupational therapy' classes of the Ranchi Indian Mental Hospital can stand a fair comparison with those of the hospitals I visited.

An institution well equipped with means for the various forms of hydrotherapy is well on the road to practically complete abolishment of the use of sedatives for highly excited patients. This most useful form of therapy was given to several patients throughout the year under report. Altogether 176 male and 44 female patients were given this treatment with very

gratifying results. The average number of hours of immersion of patients was 104.88.

Sulfosin therapy.—During the year under report 83 patients were treated with sulphur injections. The results were very good as the treatment effected recovery in 12.05 per cent and improvement in 66.27 per cent of cases.

Use of sulphur injections in skin diseases.—During the year under report, 20 patients suffering from the skin affections were treated with sulphur injections and as in the past our results were very encouraging as all the cases improved after 5 or 6 injections.

Evipan sodium.—This drug was tried in a few cases of acute excitement where other drugs failed to quieten the patients and to induce sleep. In some it worked like a charm and the patients remained quiet from 24 to 48 hours after an injection.

Rauwolfia serpentina.—A further supply of an alcoholic extract of this drug (Hindi—*Chota chand*—or what is popularly known as Hassan Imam's root) was received during the year under report from the Calcutta School of Tropical Medicine and was tried on patients, but the results were rather disappointing.

Bacilicum citratum or Subji leaf (Bisva tulsi).—The leaves of this plant contain yellowish green essential oil and 5 to 6 drops of this oil after pressing of the leaves if poured in each nostril of an excited patient allays excitement and serves at times as a powerful hypnotic. A further experiment on a larger scale was made with this drug during the year under report and the results were rather disappointing. The drug acted as a hypnotic in two cases only and the majority remained unaffected by it.

Malaria therapy.—The malarial treatment for general paralysis was continued during the year under report. It is nearly always difficult successfully to re-infect those who have had previous attacks of malaria.

Convulsion therapy by the drug cardiazol.—In 1935 when in Budapest, I was invited by Dr. Ladislaus v. Maduna, M.D., of the Royal Hungarian State Mental Hospital, to see this novel treatment of schizophrenia evolved by him. The drug immediately produces a typical epileptiform attack in the patient like that of major epilepsy. On my return I selected 12 typical cases of schizophrenia for experiment and my results are as follows:—

Stationary or not improved	Improved	Recovered
5	4	3

Games and amusement.—As in the previous years the amusement halls of both the sections were crowded with patients each evening either for music, indoor games, cinemas or theatricals and the hospital band was in attendance daily.

A number of patients assemble every afternoon on the hospital play-grounds and take part in outdoor games.

Outings.—Both male and female patients were taken out in batches daily for motor drives to Ranchi and those who were able and desirous to do their own shopping in the town were allowed to do so.

Parole.—A number of patients were granted local as well as Ranchi parole and not one of them abused the privilege so granted.

ANNUAL REPORT OF THE CALCUTTA MATERNITY AND CHILD WELFARE COMMITTEE, 1937

At the end of 1936 it was decided to change the method of work of the four Red Cross Maternity and Child Welfare Centres in Calcutta. The plan of work adopted was the same as that followed in the model Maternity and Child Welfare Centre attached to the All-India Institute of Hygiene. Work on those lines began from 1st January, 1937. The new method worked well, and the year closes with the expectation that the health of the women and children living in the selected areas will so improve as gradually to raise the standard of health of the communities living there.

Dr. Neal, W.M.S., Acting Professor of Maternity and Child Welfare at the All-India Institute of Hygiene, rendered invaluable help in launching the new method of work. She arranged short refresher courses which were attended by the Red Cross health visitors in January, February and March. It was invaluable for the health visitors to have the opportunity of living and working in the Institute Centre and of thus seeing in operation the plan they were being asked to follow in their own centres.

TRIENNIAL REPORT ON THE WORKING OF THE CIVIL HOSPITALS AND DISPENSARIES IN THE PROVINCE OF ASSAM FOR THE YEARS 1935, 1936 AND 1937

In spite of the financial stringency there was, during the triennium, appreciable progress in the extent of medical relief offered in public and private hospitals and dispensaries. The number of institutions increased by 21 making a total of 281 hospitals and dispensaries of all kinds functioning at the end of the period. The largest increase, viz, 13, naturally occurs under the head 'Local Fund Dispensaries' which accounts for nearly two-thirds of the total number of institutions. Of these, Kamrup was responsible for 5, Darrang and Lakhimpur 2 each and Nowgong, Goalpara, Sylhet and Cachar 1 each. Two state dispensaries were opened—one in the Naga Hills at Ghukhya and another in the Garo Hills at Bajengdoba. The rest of the 21 dispensaries are made up of departmental, railway and private dispensaries.

Along with this there was, during the period, also an increase of 151 beds, the majority of which were reserved for women. Apart from the Ganesh Das Red Cross Hospital for women and children at Shillong—which represents one of the chief achievements of the period—maternity or female wards or blocks were opened at various places. Simultaneously with increase in the accommodation, better nursing was made available at several district town hospitals in the plains. These results were largely due to private philanthropy and Government join the Inspector-General of Civil Hospitals in extending their warmest thanks to those who helped in this most desirable advance.

The increased and improved facilities provided for in-door medical treatment naturally resulted in a large increase in the number of in-patients who numbered 80,620 as compared with 63,600 in the preceding triennium. The out-door attendance, however, in spite of the increase in the number of dispensaries, shows a slight fall.

Kala-azar.—The persistent increase in the number of kala-azar patients in spite of the efforts of the public health department is a clear warning against any relaxation in the campaign waged against it.

Tuberculosis.—Tuberculous cases increased by about 20 per cent. Little has so far been done to tackle this disease in this province. There is no sanatorium nor even a clinic except the one recently opened at Shillong. Departmental activities have till now been confined to propaganda by means of lectures and demonstrations with the help of magic lanterns. It is realized that this is not enough and Government have recently ordered that the public health department should go a step further and advise those cases that come to their notice regarding proper treatment and precautions. Examination of sputa, free of charge, has in other countries been found to be an essential step in combating this disease. Government are now proposing to make a beginning with this in those hospitals and laboratories which have the necessary staff and equipment and gradually to extend it to other hospitals when it is possible to provide these with the necessary staff and equipment.

Leprosy.—This malady is receiving an increasing amount of attention in some parts of the Province. Besides the new Municipal Leper Asylum at Gauhati which came into existence in 1934 the number of centres constructed mainly out of the contributions

from the Assam Branch of the British Leper Relief Association increased by 20. Otherwise, there was no change in the number of institutions where this disease is treated or in the method of treatment.

Yaws.—This disease is fairly widespread in Lower Assam and is engaging the attention of the public health and the medical authorities. The increase of 3,292 cases under this head is largely the result of the intensive campaign leading to the detection and treatment of more cases.

Malaria.—Malaria continued to occupy the best part of the activities of the Assam Medical Research Society. Apart from investigation into anti-larval measures, malaria surveys and village treatment schemes with cinchona febrifuge financed by Local Boards and Government, the society evolved in co-operation with the public health department and the provincial advisory malaria committee 19 anti-larval and 5 treatment schemes after completing a survey. The short courses in malariology run by the society were availed of by Government, tea gardens and local bodies.

ANNUAL REPORT OF THE EXECUTIVE HEALTH OFFICER FOR THE CITY OF BOMBAY FOR THE YEAR 1937

The conditions of public health of the city during the year were satisfactory. The number of live births registered during the year was more by 4,687 than the number of deaths. This excess of births over deaths was equivalent to 4.0 per 1,000 population calculated on the census of 1931 and was recorded seven times in succession. Before 1931 there was no such excess since 1866, the year in which birth records were instituted.

Compared with the decennial averages (1927–36) the total number of deaths shows an increase of 3,690, the principal increase in the mortality being 1,496 under respiratory disease, 356 under tuberculosis, 323 under congenital debility and diseases of early infancy, 268 under smallpox, 219 under diarrhoea and enteritis, 180 under dysentery, 142 under enteric fever, 106 under cerebrospinal fever, 30 under diphtheria, 332 due to old age and 90 due to violence.

On the other hand there was decrease in the deaths under acute and remittent fever by 109, under malarial fever by 91, under puerperal state by 41, under cholera by 26, under leprosy by 18 and under influenza by 14.

The deaths among infants under one year of age numbered 8,688, being 258 less than in the preceding year and 1,015 more than the annual average in the decennium 1927–36. The infant mortality rate expressed as the number of deaths in infants per 1,000 registered births was 245.0 for the year 1937. The lowest rate was 218 registered in 1932.

The number of municipal nurses employed is ten, one being attached to each of the ten district registrars' offices. They visit daily the localities and the chawls inhabited by the poor and help to diffuse and popularize elementary knowledge of the principles of health and hygiene and to carry such knowledge into the homes and lives of the ignorant; they give advice on the prevention of disease and the care and upbringing of infants and bring to the notice of the authorities unregistered births, unvaccinated children and cases of sickness; they also persuade prospective mothers to go to the maternity homes provided for them free. Where this provision is not taken advantage of, they attend on the women in their own houses providing them with bedding for their confinement, and with food in shape of milk and bread during the first seven days of the puerperal period. The visits of the nurses are frequently the means of bringing to the municipal dispensaries sick persons who would otherwise either not know the existence of the facilities provided or knowing them would, through indifference and apathy, neglect to benefit by them. These visits are doing much good and are welcomed and appreciated by those for whose benefit they are paid.

Service Notes

APPOINTMENTS AND TRANSFERS

Lieutenant-Colonel N. C. Kapur made over charge of the Burdwan Jail to Major K. S. Fitch on the forenoon of the 7th November, 1938.

On return from leave Lieutenant-Colonel C. M. Nicol resumed charge of the office of the Director of Public Health, Punjab, on the forenoon of the 6th December, 1938.

Lieutenant-Colonel A. D. Loganadan, Assistant Director of Public Health, Central Range, Lahore, reverted to the Military Department, with effect from the forenoon of the 6th December, 1938.

Lieutenant-Colonel H. Aung Khin was appointed Civil Surgeon, Rangoon (West), *vice* Lieutenant-Colonel J. H. Barrett, from the afternoon of the 17th December, 1938.

Lieutenant-Colonel D. P. McDonald on return from leave was appointed First Surgeon, Rangoon General Hospital, *vice* Lieutenant-Colonel H. Aung Khin, from the afternoon of the 17th December, 1938.

Lieutenant-Colonel J. H. Barrett was appointed Civil Surgeon, Toungee, *vice* Major P. A. C. Davenport, from the forenoon of the 23rd December, 1938.

Subject to the approval of the Secretary of State for India to the transfer to the Civil Branch of the Indian Medical Service of Major W. F. Cooper, that officer is appointed as a leave reserve officer under the Central Government and is attached, until further orders, to the office of the Port Health Officer, Bombay, with effect from the 9th November, 1938.

The services of Captain P. I. Franks are placed at the disposal of the Government of Bengal for employment as Surgeon to His Excellency the Governor of Bengal, with effect from the 11th April, 1938.

Captain G. P. Charlewood, Civil Surgeon, Coorg, is temporarily appointed to officiate as an Agency Surgeon, with effect from the forenoon of the 29th November, 1938, and is posted as Residency Surgeon, Mysore, with effect from the same date.

Captain F. C. Leach, whose services have been placed at the disposal of the Government of the C. P. and Berar, is attached to the office of the Civil Surgeon, Nagpur, for training at the Mayo Hospital and Central Jail, Nagpur, from the 6th December, 1938.

The undermentioned appointments are made:—

To be Lieutenants (on probation)

1st November, 1938

Frederick William Sneddon, with seniority 1st November, 1937.

Ross Morrison McCullough, with seniority 1st November, 1937.

Harry Victor Morris, with seniority 1st November, 1937.

Albert Steven Brown.

LEAVE

Colonel E. G. Kennedy, Deputy Director-General, Indian Medical Service, is granted leave on average pay for 3 months and 4 days, with effect from the 16th January, 1939. His services are placed at the disposal of His Excellency the Commander-in-Chief on the expiry of the leave.

Lieutenant-Colonel J. B. Hane, O.B.E., an Agency Surgeon, is granted leave on half-average pay for 33 days, with effect from the forenoon of the 29th November, 1938.

Lieutenant-Colonel J. M. Shah, M.B.E., Specialist in Venereal Diseases for the Bombay Presidency, has been granted leave for 25 months and 16 days from 1st December, 1938, preparatory to retirement, with effect from 17th January, 1941.

PROMOTIONS

Lieutenant (on probation) to be Captain (on probation)

C. W. Greene. Dated 16th May, 1938, with seniority from 1st January, 1938.

G. A. Graham. Dated 28th September, 1938, with seniority from 1st May, 1938.

D. McC. Black. Dated 28th September, 1938, with seniority from 1st May, 1938.

J. G. Fife. Dated 28th September, 1938, with seniority from 1st May, 1938.

N. D. Jekyll. Dated 28th September, 1938, with seniority from 1st May, 1938.

J. H. Biscoe-Smith. Dated 28th September, 1938, with seniority from 14th August, 1938.

A. C. Glendinning. Dated 28th September, 1938, with seniority from 31st August, 1938.

G. C. Retz. Dated 12th October, 1938, with seniority from 1st July, 1938.

A. R. Woodforde. Dated 12th October, 1938, with seniority from 18th July, 1938.

R. D. D. Birdwood. Dated 1st November, 1938.

The seniority in the rank of Lieutenant of Captain (on probation) B. J. Doan is antedated to the 1st May, 1936.

The seniority of Lieutenant (on probation) R. Pasmore is antedated to the 2nd March, 1937.

RETIREMENTS

Colonel G. R. Lynn, D.S.O. Dated 1st December, 1938.

Lieutenant-Colonel J. L. Sen, M.C. Dated 22nd October, 1938.

Lieutenant-Colonel N. B. Mehta. Dated 5th November, 1938.

Lieutenant-Colonel R. E. Wright, C.I.E. Dated 14th November, 1938.

Lieutenant-Colonel P. C. Banerjee. Dated 5th January, 1939.

Notes

M & B 693 IN GONOCOCCAL INFECTIONS

We have received from Pharmaceutical Specialists (May and Baker), Limited, a copy of another publication on that remarkable addition to chemotherapy, M & B 693. This 16-page booklet, which is entitled 'M & B 693 in Gonococcal Infections', is a complementary publication to 'M & B 693 in Pneumococcal Infections', and 'M & B 693 Biological and Biochemical Data'.

We understand from the manufacturers that they delayed bringing M & B 693 to the notice of venereologists until they were satisfied that the use of this product marked a real advance in the chemotherapy of that disease. This booklet which they have now produced represents the pooled results of observations in over 1,000 cases.

Copies of this publication are available to medical practitioners on request.

THE DOCTORS' CAR—OPEL

No class of professional men in the country finds a motor car so indispensable as medical men. In cities, of course, a car is as necessary to a doctor as a stethoscope, while in the small towns, mofussil districts, and throughout the huge tea and coffee planting areas of India, a doctor without a car is handicapped almost as much as one without patients.

Many thousands of medical men, with small practices, or resident in very competitive localities, find the upkeep costs of a car makes a big hole in their nett revenue, and to these in particular a few details of what is, in fact and practice, the most economical light car on the market should be of value.

A doctor's car has got to be smart and look smart and above all be as economical as it is dependable. It must not swallow fees in the form of excessive petrol consumption; it must be ready to start off on a long run over rough country at a touch on the starter, and take its owner at any reasonable sort of high speed on his rounds or to and from an urgent call.

To conform to these elementary requirements is to ask the least of an OPEL. Here's a quality-car built to do more than come and go, which any car does. OPEL does every journey with an eye to travel-comfort—ensured by even more built-in factors than its outstanding knee action front wheel suspension.

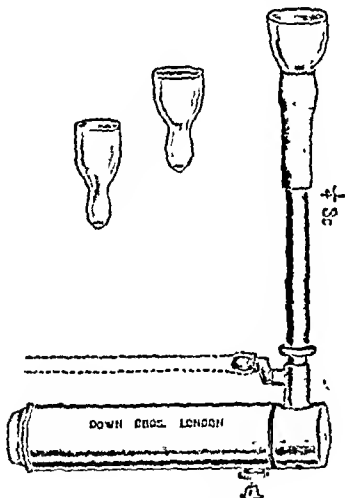
There are small models to choose from, the 10, 12 and 16. The first two are 4-cylinder cars, with 92- and 96-inch wheelbases respectively, the third is a 6-cylinder car, developing proportionately greater h.p. and having a wheelbase of 104 inches.

THE TREATMENT OF CHRONIC TONSILITIS By SUCTION AND IRRIGATION

THE method of treatment is similar to that described by Mr. E. A. Peters in his book 'Tonsils and Nasopharyngeal Sepsis' and is specially useful in cases of middle-aged patients and adults who wish to postpone or avoid enucleation of the tonsils, it affords immediate relief and diminishes focal sepsis.

The instrument described is for applying negative pressure and supplying a stream of antiseptic solution to the tonsils alternatively, it is used in connection with either an electric or hydrostatic suction pump and has the great advantage of being easily operated with one hand, leaving the other free for the use of a tongue depressor.

The instrument which I have designed has proved most satisfactory in use: it consists of a hollow metal handle which also acts as a water-tight container for antiseptic solution (water or colloidal iodine), near to the top of the handle is an air-hole, situated immediately below a conveniently-placed press button, both air-hole and press button can be operated simultaneously by pressure of the ball of the thumb. To apply vacuum the air-hole is closed, to flush the tonsil under pressure the air-hole is kept closed and the button is pressed at the same time.



Attached at a right angle to the handle is a metal tube of suitable length fitted with a conveniently placed mount to connect to the rubber tube of a suction apparatus; at the distal end of the metal tube is a flexible rubber tube joint and a glass suction cup to apply to the tonsil, the rubber joint allowing freedom of movement for application of the cup; the cups are of various sizes and interchangeable, the particular case being treated and being transparent the tonsil can be kept under observation during treatment. Further, the treatment can be carried out without the use of a local anaesthetic in most cases.

The instrument is made by Messrs. Down Bros., Ltd., London.

GEORGE BOTROS,
Cairo.

BAYER REMEDIES LIMITED

THE medical profession is requested to note that a Company started operations on 1st January, 1939, under the style of Bayer Remedies Limited with its registered office in Bombay and branches in the principal

provinces of India. The company has been registered under the Indian Companies Act, with a capital of Rs. 30,00,000 of which Rs. 20,00,000 is subscribed and paid up. The company having been constituted as a private limited company with Messrs. Haverro Trading Company, Limited, incorporated in Rotterdam (Holland) as one of its important shareholders, no shares will be offered, for an initial period, to the public at large.

Bayer Remedies Limited will handle all the pharmaceutical, sero-bacteriological, chemical, dental and veterinary preparations manufactured by 'Bayer' as well as 'Behringwerke' of I.G. Farbenindustrie Aktiengesellschaft, Germany, and hitherto handled in India, Burma, Ceylon and Afghanistan by Messrs. Haverro Trading Company, Limited.

The company is a sign of India's growing importance in international commerce and trade. But it has also a definite purpose to fulfil. Most of the present-day pharmaceuticals are too complex to be efficiently handled by a general mercantile firm such as Haverro's. Their handling (storage, distribution, directions for use, etc.) calls for a highly specialized body equipped for technical service and backed by continuous research. To these matters the company wishes to devote its exclusive attention.

The services of most of Haverro's experienced staff having been secured by Bayer Remedies Limited, and the products being guaranteed by the same well-known Bayer cross, the company fervently hopes to secure the same confidence and co-operation of the medical profession in this country as hitherto enjoyed by Messrs. Haverro Trading Company, Limited.

Publishers' Notice

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles are entitled to receive 25 reprints *gratis*; additional reprints can be obtained on payment. No reprints will be supplied unless contributors ask for them at the time of submitting their manuscripts.

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Original Articles

SOME NOTES ON CLINICAL HEART DISEASE*

By GERARD KELLY, F.R.C.P. (L)

MAJOR, I.M.S.

Professor of Clinical Medicine, Medical College Hospitals, Calcutta

I HAVE compiled these few notes in order to indicate to the general practitioner something of the real substance of heart disease: there is nothing in them for the specialist.

Partly by choice and partly by request I have included a few remarks on the following:—

1. The problem or problems of the cardiovascular dysfunction case.
2. Heart failure—
Left-sided heart failure.
Right-sided heart failure.
Mixed failure.
3. Symptomatology—
Dyspnoea.
Pain.
Palpitation.
4. Neurocirculatory asthenia.
5. Auscultation.
6. The estimation of blood pressure.
7. Radiography of the heart and aorta.

THE PROBLEM OR PROBLEMS OF THE CARDIO-VASCULAR DYSFUNCTION CASE

A patient complaining of symptoms of cardiovascular dysfunction presents for your appreciation one or more of the following problems:—

1. Is he a neuropath or a cardiopath?
2. If a cardiopath, is there evidence of failure or impending failure, and to what extent is the heart incapacitated?
3. If a patient is a cardiopath, it does not follow that all the symptoms are due to the heart. There may be a neurotic element. That is to say—a patient may be both a cardiopath and a neuropath: if so, what is the responsibility of each factor in the case?

'The cardiopath tends to become a neuropath'—Mackenzie. Actually, many cardiopaths tolerate their disablement with great fortitude, but a proportion only, often those with but little cardiac damage, suffer more from psychoneurosis than heart. A very occasional cardiopath may proclaim his psycho-neuropathy by addressing his doctor as if the doctor had given him his disease.

We shall refer very briefly to the commoner mechanisms, left-sided and right-sided failure.

When we speak of left-sided failure, *e.g.*, hypertensive heart failure or failure of the left ventricle behind high systemic blood pressure, we visualize adequate filling but inadequate emptying of the left side of the heart with corresponding increase in its size. Our conception of right-sided heart failure, *e.g.*, failure of the right ventricle behind mitral stenosis or behind chronic bronchitis and emphysema is precisely similar.

Just over a century ago an English physician, James Hope, inspired by the work of Corvoisart, evolved the 'back-pressure theory' of cardiac failure. 'As an obstacle to the circulation', he said, 'operates on the heart in a retrograde direction, the cavity situated immediately behind is the first to suffer from its influence'. Otherwise stated, congestion back of the failing chamber is the cardinal feature of congestive failure rather than inadequate output of the failing chamber. This rediscovery of Hope's

Heart failure.

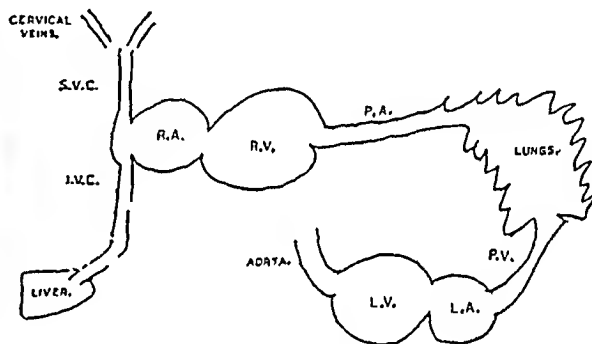


Diagram illustrating the back pressure theory of congestive (left-sided and right-sided) heart failure.

vital observation is a recent landmark in the study of heart failure.

LEFT-SIDED (CONGESTIVE) HEART FAILURE

This is the commonest of all forms of heart failure. Its causes are left ventricular defeat by overstrain and disease of the left ventricle, namely, hypertension, coronary disease (arteriosclerotic or syphilitic) and valvular disease (aortic regurgitation or stenosis and mitral disease with preponderant regurgitation). Pulmonary hypertension or a rise of pressure in the pulmonary circuit behind the failing left ventricle constitutes the first stage of left ventricular failure. This is manifested clinically by an accentuated pulmonic second sound, by dilatation of the pulmonary vessels seen in the lung roots of the radiogram and by mitralization of the heart radiologically, owing to the enlargement of the pulmonary conus of the right ventricle behind the pulmonary hypertension. In the next stage there is transudation from the engorged vessels with the production of pulmonary oedema, often paroxysmal later persistent. Hence the classical symptoms of left-sided failure are effort dyspnoea and cardiac asthma both of which own the same

* Being a paper read at the Calcutta Medical College Reunion, 1938.

fundamental mechanism, i.e., pulmonary congestion and œdema. The most ominous signs of left-sided failure are gallop rhythm and pulsus alternans which may be combined with cardiac asthma to form the gravest trilogy in the domain of heart disease. Negativity of T in lead I of the electro-cardiogram is of correspondingly evil prognosis. A widened low voltage and usually a bifid or flat-topped P-wave have recently been described by Wood and Selzer as an early sign of left ventricular failure.

Left ventricular failure is usually a passing phase, for the increased resistance in the lungs soon stresses the right ventricle which fails in turn thereby relieving somewhat the symptoms of left ventricular failure. While the phase of left ventricular failure lasts there is no œdema nor venous congestion, although pulmonary hypertension and even pulmonary œdema are present and periodic attacks of nocturnal dyspnoea occur. Even hydrothorax may occur at this stage before the right ventricle fails. Much less commonly the ventricular imbalance of a forceful right ventricle and a failing left ventricle may be long maintained to the greater respiratory distress of the patient; this form of left ventricular failure is sometimes improperly called 'dry failure', a term that more correctly describes a right-sided congestive failure dehydrated by salyrgan.

Coronary thrombosis is a combination of left heart failure and of peripheral circulatory failure. When the usual clinical sequence obtains in a case hitherto free from congestive failure, the first phase of coronary thrombosis is marked by pain or dyspnoea and by shock, whereas the second phase, denoted by the offset of shock, is characterized by the appearance of congestive failure. In any case, the greater the shock the less apparent is cardiac failure and *vice versa*. In shock the heart's income is reduced to an extent which is unembarrassing even to the grossly infarcted heart. With the passage of shock, however, the venous income increases and the failure of the left heart to rise to the occasion is soon translated to the right heart in terms of congestive failure.

In pure left ventricular failure the rhythm is regular. The inquiry of Parkinson and Clark-Kennedy in 1926 regarding failure with normal rhythm established that 'there is an important relation between the pathological basis for a cardiac disease and failure and the absence of fibrillation. In general, auricular fibrillation was the rule in rheumatic heart disease and goitre, while failure with normal rhythm was the rule in hypertension, coronary disease and emphysema'. It is also the rule in cardiovascular syphilis. In the latter ætiological groups, ventricular strain and disease cause the ventricles to give way before the auricles have reached the stage of fibrillation. Gavey and John Parkinson remind us that 'apart from the factor of rhythm and the factor of specific pathology conditioning rhythm, there is a third factor of

the heart-rate. A regular rhythm failure may occur with a normal or moderate ventricular rate, or a high rate'. Failure with normal rhythm may be more serious than when auricular fibrillation consorts with failure. Gavey and John Parkinson's recent investigation regarding the clinical value of digitalis in heart failure with normal sinus rhythm reveals the following pertinent facts: 'In heart failure with normal rhythm digitalis is helpful in rather more than half the cases. In heart failure with auricular fibrillation, digitalis is more often helpful than it is in normal rhythm, for it benefits more than two-thirds. The real difference in the response of heart failure to digitalis lies not between auricular fibrillation and normal rhythm, but rather between rheumatic auricular fibrillation and all other kinds of heart failure irrespective of rhythm. The course of the disease after the onset of failure in normal rhythm is short—18 of 29 patients died within a year'. Failure with normal rhythm is relatively more common in India in that for one thing cardiac rheumatism which accounts for about half the cases of auricular fibrillation in Great Britain and Ireland is correspondingly less prevalent in India.

RIGHT-SIDED (CONGESTIVE) HEART FAILURE

This is most frequently a proclamation of previous left-sided failure due to hypertension, coronary disease or aortic valvular disease. But the causal example *par excellence* of right ventricular strain and failure is the correspondingly infrequent congenital condition, namely pulmonary stenosis, which incidentally produces pulmonary ischæmia and a proclivity to pulmonary tuberculosis—the converse effects of mitral stenosis.

The middle share of responsibility for right-sided heart failure is claimed, firstly, by the pulmonary hypertension that is most emphatically produced by mitral stenosis, and, secondly, by pulmonary disease, notably emphysema, both of which quite obviously obstruct the blood flow through the lesser circulation. The ultimate determinant, however, of right-sided failure is coincident right ventricular disease, e.g., arteriosclerosis, which so conspicuously involves the left ventricle, and expectedly implicates the right ventricle as well.

A most exceptional cause of right heart failure, i.e., primary endarteritis of the pulmonary arteries, is nevertheless worthy of recall on this occasion because Sir Leonard Rogers of this College described some cases in Bengal soon after its original description by Ayerza of Buenos Ayres.

The clinical picture of right-sided heart failure is reflected in the venous reservoir formed by the systemic and portal venous systems behind the failing right ventricle. Its main features are, accordingly, engorged cervical veins (Lancisi's sign), engorgement of the liver, and systemic œdema. Dyspnoea is an almost invariable symptom in right-sided failure owing to the fact

that the causes of right-sided failure essentially implicate the pulmonary circuit in the manner indicated above. For the same reason cyanosis is rather more conspicuous here than in left-sided failure.

In pneumonia the right ventricle has to operate against the pulmonary lesion, nevertheless the clinical picture of right-sided heart failure is rarely evident because failure is predominately peripheral. We have already referred to the antagonism existing between shock and congestive cardiac failure in coronary thrombosis, evidently peripheral failure nearly always prevails in pneumonia.

MIXED FAILURE

Mixed failure is usually seen in auricular fibrillation. Both ventricles fail more or less simultaneously from stress of excessive and ineffective beating.

SYMPTOMATOLOGY

'In diagnosis one physical sign is worth many symptoms.'—Horder. I am not sure that this generalization holds for heart disease, in that, for example, a history of effort angina or of a previous coronary thrombosis without abnormal signs, or a history of nocturnal cardiac asthma are all of the highest diagnostic value.

The best method, to my mind, of clinically investigating the ordinary heart case is probably as follows :—

1. The first point is to have in mind what are the symptoms of cardiac damage and decide if the patient has them, ignoring unessential symptoms, *e.g.*, has the patient angina of effort, dyspnoea of effort, cardiac asthma? Incidentally the three most outstanding symptoms of cardiovascular dysfunction, according to standard authors, are dyspnoea, pain, and palpitation. Students call them the 3 Ps—panting, pain and palpitation.

2. The next consideration is, What are the signs of heart disease and has the patient got them? *e.g.*—

valvular disease,
cardiac enlargement,
hypertension,
dilatation of the aorta,
congestive failure,
auricular fibrillation or flutter, and
abnormal electrocardiograms.

DYSPNOEA

The term dyspnoea means laboured breathing registering on consciousness the difficulty experienced by the heart and lungs in meeting their liabilities. Cardiac dyspnoea may be clinically divided into—

1. Dyspnoea on exertion.
2. Dyspnoea at rest—
 - (1) Orthopnoea,
 - (2) Cardiac asthma and acute pulmonary oedema.

Excepting in pulmonary heart disease and in hypertensive heart failure, the respiratory rate in cardiac dyspnoea rarely exceeds 30 per minute. As Christian said 'dyspnoea is poorly, sometimes not at all, depicted by the charted rate of respiration'. When you encounter rapid shallow respiration, you should look for evidence of acute pulmonary or pleural disease, or interpret neurocirculatory asthenia; such polypnoea is usually absent in cardiac disease excepting when the pericardium is involved.

Another remarkable respiratory symptom of neurocirculatory asthenia is sighing or suspirous respiration. Now sighing respiration is a subjective feeling of difficulty in taking a full breath. This is eventually overcome and a deep breath is taken, followed by a long sighing expiration and relief. Sighing respiration often masquerades as 'shortness of breath', 'breathlessness', 'difficult breathing at times', or 'a feeling of suffocation'. Gallavardin's *le trépid*, palpitation, left inframammary pain and sighing respiration is diagnostic of neurocirculatory asthenia. This triad of symptoms is a pleasing contrast to the evil trilogy of left ventricular failure.

Cardiac asthma is a severe grade of paroxysmal dyspnoea due to sudden or acute failure of the left ventricle. Its basis is most frequently hypertensive and arteriosclerotic heart disease, commonplaces amongst the leisured classes of Indians. The tempo of life and the diet of the Indian ryot, on the other hand, are certainly less conducive to such developments. Bronchial asthma and cardiac asthma are frequently confused and so I have tabulated their differential diagnosis.

Bronchial asthma

Cardiac asthma

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. The majority of cases of true spasmodic asthma begin before the age of 25. 2. There is a history of years of sensitiveness to foreign proteins and of respiratory infections, <i>e.g.</i>, winter cough. 3. Wheezing is invariably. 4. The dyspnoea of bronchial asthma is mainly expiratory. | <ol style="list-style-type: none"> 1. Cardiac asthma is very rare before the age of 40. 2. The history of attacks of cardiac asthma rarely exceeds 2 years: I am constantly having patients sent up as cardiac asthma when they have had attacks for 5 to 10 years, which, of course, excludes it. Duration is therefore an important differential point. 3. There may be no wheezing, simply dyspnoea and oedema of the lung bases. Often this oedema affects the small tubes thereby producing some spasm. 4. The dyspnoea of cardiac asthma is both inspiratory and expiratory. |
|---|--|

Bronchial asthma

5. Rhonchi are mainly expiratory, widespread and especially well heard bilaterally over the front of the chest. No moist râles can be detected at the bases behind. Bronchial asthma is characterized by bronchial spasm without œdema of the lungs.

6. Signs of heart disease are absent in uncomplicated bronchial asthma.

7. Bronchial asthma is unlikely to lead to right-sided failure.

8. Bronchial asthma implies a good prognosis and very many years of useful life.

9. Rapid and favourable to adrenalin.

Cardiac asthma

5. Râles are moist inspiratory and basal. Quite frequently they are the squeaky râles of the emphysematous asthmatic subject. In fact the lung signs in cardiac asthma may be indistinguishable from those of bronchial asthma. In cardiac asthma there is œdema with or without spasm: if with spasm the smaller tubes are involved.

6. Signs of heart disease are invariably present in cardiac asthma—

- (1) Hypertension.
- (2) Cardiac enlargement.
- (3) Markedly accentuated pulmonic second sound.
- (4) Gallop rhythm.
- (5) Pulsus alternans.
- (6) Abnormal electrocardiograms especially T₁ negativity.

Confusing factors are—

- (1) The heart rate may be only slightly accelerated.
- (2) The heart rhythm remains normal.
- (3) Heart murmurs are usually absent, though sometimes aortic valvular murmurs or the murmur of mitral stenosis is heard.
- (4) The lung signs may almost entirely mask the heart sounds and any existing murmurs.

7. Cardiac asthma is likely to lead to congestive (right ventricular) failure before long.

8. Cardiac asthma implies a bad prognosis: such patients rarely live 2 years.

9. Responds to morphine and atropine.

PAIN

The coronary, or third circulation, may be conveniently studied by the Harvey film which shows the exposed heart beating. In ventricular systole the musculature and subsequently the coronary arteries are tightly contracted producing thereby a notable pallor of the ventricular walls in testimony to their relatively bloodless state. In ventricular diastole the musculature and subsequently the coronaries relax and the walls become flushed with blood, clearly indicating that the rate of the coronary circulation is optimal in those whose coronary trunks are most highly elastic. Coronary insufficiency productive of myocardial ischæmia results in cardiac pain.

The causal factors, therefore, of cardiac pain are coronary arterio-sclerosis which narrows, and coronary thrombosis which occludes the lumen of the coronaries, and syphilitic aortitis which obstructs the coronary orifices. The low diastolic pressure of aortic regurgitation or the low cardiac output in aortic stenosis may likewise cause cardiac pain as a result of the delivery of an inadequate volume of blood to the coronary circulation and myocardial fibres.

Marked left ventricular enlargement by increasing the territory of the coronary circuit, imposes a further liability resulting in the easier provocation of pain in the subjects of hypertensive heart disease or aortic regurgitation. Cardiac pain is elicited on exertion or excitement because the total coronary diastole per minute is thereby shortened and because coronary sclerosis by limiting the extent of coronary dilatation prevents the coronaries from rising to the occasion.

It is rather interesting to recall that, although Heberden gave a classical description of angina pectoris (paroxysmal substernal oppression) about 1768, it was his friend William Jenner who evolved the essential pathologic lesion, namely, coronary sclerosis. As Jenner's master, however, the great John Hunter, was at the time a victim of angina, his faithful pupil did not disclose his pathologic discovery until after Hunter's death some twenty years later, lest the announcement might prejudice Hunter's career. Jenner predicted and found extensive coronary sclerosis in his necropsy of John Hunter. Thereafter coronary disease was regarded as a pathological curiosity and occlusion was considered to be quite incompatible with life, until Herriek's clinical description of coronary thrombosis (prolonged substernal oppression) in 1912.

PALPITATION

'Palpitation (from the Latin, *palpitare* to throb) is the consciousness of the heart's action, whether fast or slow, regular or irregular. It is generally a disagreeable sensation and sometimes in a sensitive person it is very distressing.'—White.

Palpitation was described and attributed to cardiac dysfunction by Galen, centuries before cardiac pain or cardiac dyspnoea were recognized. It is, however, the least important of the three main symptoms of cardio-vascular dysfunction. The majority of people who complain of palpitation alone have no organic heart disease. When palpitation is associated with heart disease, cardiac dyspnoea and pain are present as well. When palpitation is symptomatic of neuro-circulatory asthenia it is the leading component of Gallavardin's *le trépid*. The child very rarely complains of palpitation, but the nervous adult may complain of a variety of sensations, often of wide reference, to be interpreted as palpitation. Associated aerophagy often confirms the suspicion of a neurogenic origin.

Palpitation may be a primary symptom of neurocirculatory asthenia, thyrotoxic heart, or of hypertension, more commonly, or of auricular fibrillation, flutter, or heart block, less commonly. Carefully note the sensations described, and, if palpitation occurs in bouts, enquire into the onset and offset of such attacks. Thus you may obtain a clue as to the nature of any underlying arrhythmia. 'Feeling the heart turning over', 'giving a jump', or 'seeming to stop', suggests extrasystoles. Palpitation which is 'felt at times' should arouse a suspicion of paroxysmal tachycardia, fibrillation, or flutter.

NEUROCIRCULATORY ASTHENIA

When a neurasthenic subject's most outstanding inferiority is instability and an easy fatigability of his neurocirculatory apparatus, conditions of strain are likely to elicit neurocirculatory asthenia, variously designated soldier's heart, D. A. H., effort syndrome or cardiac neurosis.

Neurocirculatory asthenia may be defined as neurasthenia presenting itself with circulatory symptoms and with signs *usually* of an overactive circulation, such as might occur in normal persons on severe physical exertion if fatigue of the skeletal muscles or of the central nervous system did not intervene to prevent such exertion. It is most commonly displayed by young adults, more especially females. It may complicate infection, heart disease, other chronic illnesses and trauma.

Its importance is twofold

1. It is frequently mistaken for cardiac disease; over 200 years ago Senac stressed this difficult distinction between organic heart disease and nervous disorders.

2. It is often superimposed upon cardiac pathology—rheumatic, coronary, hypertensive, or syphilitic heart disease—with consequent enhancement of strain and worsening of the prognosis: the assessment of each factor in such a case is often not a little difficult. Not uncommonly in the presence of mild organic changes the severity of the symptoms is quite disproportionate to the available signs, and so the main burden of them is rightly attributed to attendant neurocirculatory asthenia.

Symptomatology

The general impression left on the physician is the extreme diffuseness of the manifestations: there are so many things that there are too many—Gallavardin. The combination of excitement, exertion and fatigue precipitate the maximum degree of symptoms.

1. The cardinal symptoms are four, namely, palpitation, left mammary or inframammary pain, dyspnoea, and exhaustion.

2. Vaso-vagal and vaso-motor symptoms include faintness, dizziness, flushing, and coldness of hands and feet, which may be somewhat cyanotic.

3. Symptoms expressive of physical and mental exhaustion and anxiety states, *c.g.*, weakness, lassitude, fatigue, irritability and nervousness.

4. Symptoms suggestive of hyperthyroidism; observe the tremor of the outstretched fingers of the cold clammy hands. This tremor and sweating of the hands, feet and axillæ may be indicative of potential hyperthyroidism and the thyroid may occasionally be found a trifle hard on palpation.

Physical type.—The individual endowed with a hyposthenic constitution is the physical type most likely to exhibit neurocirculatory asthenia. The physique of the hyposthenic individual is poor, the chest long and narrow or flat. The heart is central, vertical and pear-shaped with a low-lying diaphragm. The term 'drop heart' expresses the classical configuration of the nervous heart which is likened unto that of a 'hanging drop'. The nervous make-up is correspondingly poor: the individual belongs to the anxious, worrying, highly-strung, jumpy type with exaggerated deep reflexes.

Physical signs.—(1) Peripheral. (2) Central or cardiac.

Peripheral signs.—The rapid Corrigan-like pulse with widened pulse pressure is suggestive of aortic regurgitation. The systolic pressure is moderately elevated from the increased *vis à tergo*, but the diastolic pressure is normal or even subnormal—thereby distinguishing this central hypertension from essential hypertension.

Central or cardiac signs.—(1) Precordial. (2) Auscultatory. These signs superficially resemble the signs of mitral disease.

Precordial signs.—The cardiac impulse is forcible and jerky (forcible impulse implies increased force *plus* quick out-thrust, whereas a heaving impulse implies increased force *plus* a slow deliberate out-thrust). Its wide diffusion due to cardiac overaction on perhaps a thin chest wall further simulates cardiac enlargement. Palpation, however, reveals the maximal impulse within the mid-clavicular line. In the absence of radiology, palpation of the maximal impulse is the only fairly reliable guide as to the position of the left heart border, provided the heart is not displaced. Precordial or substernal tenderness is not uncommonly noted and is to be regarded as a sign of a sensitive chest wall further sensitized by cardiac overaction.

Auscultatory signs.—The first sound is accented or reduplicated. Accentuation and slurring of the apical first sound may produce a bogus 'slight presystolic murmur' just as accentuation of the second sound may sometimes in these cases produce a bogus 'slight aortic diastolic whiff' at the left lower end of the sternum. Temporary gallop rhythm is occasionally present. Cardio-respiratory murmur and basal and apical systolic murmurs are expected findings in a markedly overacting heart and further

contribute to the not infrequent misdiagnosis of heart disease.

DIAGNOSIS

Palpitation.—Palpitation associated with rapid regular heart action suggests neuro-circulatory asthenia. Gallavardin's triad is diagnostic of it as we have already pointed out in connection with sighing respiration which is never a feature of organic heart disease. Premature beats and paroxysms of tachycardia cause the most prominent palpitation in the subjects of neuro-circulatory asthenia. Incidentally overdosage with insulin may also cause tachycardia, palpitation and cardiac overaction.

Pain.—The heartache of neurocirculatory asthenia replaces the headache of ordinary neurasthenia or the abdominal discomfort of nervous dyspepsia. It is a dull and heavy left breast ache or soreness or gnawing pain due to the impact of an overacting heart upon a sensitive chest wall. It may be punctuated by characteristic, transient, short, stabbing pains like pin-pricks or like sword thrusts in severe cases. The patient's aspect, however, is not that of one suffering from pain.

The heartache or left mammary pain of neuro-circulatory asthenia has been inaccurately described as precordial notwithstanding the fact that it extends far outside the precordium. Left inframammary pain, for instance, may be referred to the left scapula and the extension of left supramammary pain into the left arm often misleads the patient or her friends to a misdiagnosis of angina pectoris. Left supramammary pain may also extend to the left side of the neck. Hyperæsthesia is common and persistent in established cases of left mammary pain. Chest-wall tenderness is, as a rule, remarkable by its absence in cases of pain of coronary origin, including that of coronary thrombosis.

The onset and offset of heartache are usually gradual. It may occur at any time especially during fatigue. Effort on the part of the neuro-circulatory asthenic subject is limited by exhaustion and not by pain. If an anginal subject's pain is elicited by emotion or eating, it will always be induced by exertion as well. Finally the heartache of neurocirculatory asthenia may last for weeks or months with intermissions.

Clifford Allbutt has vividly outlined for us the dissimilar clinical pictures of left inframammary pain and of angina pectoris. 'These faintnesses, palpitation, gasping, stiflings, bodily agitations, hyperæsthesias and psychical commotions', he said, 'are so wholly unlike the ruthless grip of angina pectoris as these frantic alarms are unlike its silent passion.'

A differential diagnostic table of left inframammary pain and angina pectoris by Doris Baker is given below. Her investigation of left inframammary pain under the direction of John Parkinson is a model of clinical research in heart disease.

Angina pectoris

1. Commoner in men.
2. Occurs during effort or excitement; effort is limited by pain.
3. Pain in brief paroxysms, onset and offset abrupt; the paramount symptom.
4. Site of pain sternal, or across the chest, supramammary or brachial; spinal distribution C8, D1, 2, 3, also 4.
5. Aspect expresses great pain.
6. Hyperæsthesia none or only following a paroxysm.

Left inframammary pain

1. Far commoner in women.
2. Occurs any time especially during fatigue; effort is limited by exhaustion rather than pain.
3. Pain generally continuous, lasting weeks or months with intermissions, onset and offset gradual, duration indefinite: one of many symptoms.
4. Site of pain left inframammary extension to left scapula, less often supramammary, rarely and slightly left brachial; spinal distribution D5, and 6.
5. No outward aspect of pain.
6. Hyperæsthesia common and persistent, especially in long-standing cases.

Dyspnœa.—The dyspnœa of neurocirculatory asthenia is subjective rather than objective. It gives the impression rather more of a respiratory dysrhythmia than of laboured breathing. It is not remarkably related to exertion but rather to emotional upsets. It is unattended by evident distress or cyanosis such as may document a correspondingly severe grade of cardiac dyspnœa. We have already referred to tachypnœa and sighing respiration, so characteristic of neuro-circulatory asthenia. Cardiac enlargement and the signs of heart failure are conspicuous by their absence. Dyspnœa in a young person in association with an overacting normal-sized heart is commonly symptomatic of neurocirculatory asthenia. Exertional dyspnœa in persons at and above middle life should be thoroughly investigated from the cardiac standpoint: it is, as we have already said, the paramount symptom of left-sided failure.

Weakness.—Patients complaining of asthenia often subconsciously feel that it must somehow be due to heart disease still undiscovered and they not infrequently convey this subtle suggestion to their physician. In actual fact when general weakness is attributable to heart disease the signs of cardiac disease are obvious inasmuch as the cardiac causes of general weakness are heart failure and active endocarditis.

In pronounced neurocirculatory asthenia general weakness is more prominent being now translated into exhaustion. But the most prominent causes of general weakness, exhaustion and prostration are infectious diseases, nutritional disturbances, malignant disease, nervous disorders, etc., and to these the physician should primarily address himself.

Thyrotoxicosis.—Thyrotoxicosis and severe anæmias are also common causes of an

overactive heart. Exclude thyrotoxicosis by the absence of a staring expression, eye signs, thyroidal signs, elevated B.M.R. and loss of weight. In latent thyrotoxic cases eye signs may be absent and the thyroid is not notably enlarged. In thyrotoxic heart disease, the hands are warm and moist and not cold and blue as in neurocirculatory asthenia, the hair is not infrequently prematurely grey and the heart sounds are very loud and 'angry'.

AUSCULTATION

The secret of successful cardiac auscultation is the positive identification of the *first* and *second* heart sounds by a technique of the mind, ear and thumb well trained in the synchronization of hearing and touch. Apply your chest-piece to the mitral area over the maximal impulse and your thumb to the carotid artery. Shut your eyes as an aid to dissociating everything else from your mind and feel the carotid impact against your thumb coincident with the single intense demarcated auditory impression of the first heart sound. Employ this method deliberately in the auscultation of every heart, rather than spasmodically invoke it in times of auscultatory stress. Thus only can be attained a calm and sure efficiency in disentangling the more complex sounds and murmurs. Evan Bedford and Parkinson invariably employ this technique and so we might with advantage do likewise. Remember that systole equals the first sound *plus* the short pause and that diastole equals the second sound *plus* the long pause. Observe that the first sound is lower-pitched, longer and louder than the second sound, that it is preceded by the long pause and that it is followed by the short pause which separates it from the second sound. Trace the first and second sounds down from the pulmonary area to the cardiac impulse.

Gallop rhythm is such a striking, facile and important auscultatory sign that I cannot refrain from making some reference to it. In gallop rhythm a third or extra sound is introduced into the cardiac cycle. Gallop rhythm, therefore, consists of the usual first and second sounds *plus* an extra sound which is sometimes not only audible but palpable as well. I may discuss the origins of this extra sound in a later paper. However it may be, gallop rhythm must be clearly distinguished from reduplication of the heart sounds which is a partial idea. The three sounds of a gallop are fairly equidistant. In presystolic gallop rhythm the extra sound occurs somewhat before the first sound and the spacing of the sounds is more even than in protodiastolic gallop rhythm where the extra sound occurs immediately after the second sound. The punctum maximum of gallop rhythm is usually about the impulse, though it is frequently audible over a much wider area. Its resemblance to the foot-falls of a galloping horse is best appreciated when the heart rate surpasses 80 per minute. Temporary gallop

rhythm commonly signifies an overacting heart or a severe anaemia or acute myocarditis in diphtheria, scarlatina, rheumatic fever or typhoid fever. Persistent gallop rhythm usually proclaims failure of the hypertensive or arteriosclerotic heart, or it may be a sign of coronary thrombosis or of a bundle branch block, etc. With the abolition of failure the gallop disappears for the time being. The prognostic significance of persistent gallop rhythm is obviously bad. The advent of gallop rhythm may sometimes be foretold at an earlier phase by impurity of the first sound, *i.e.*, prolongation with a tendency to splitting.

THE ESTIMATION OF BLOOD PRESSURE

This is one of the commonest and for all that one of the most important of all clinical procedures. Nevertheless many doctors are rather nebulous about its most vital determination, namely, the diastolic pressure. Obviously the first essential in the estimation of blood pressure is an accurate conception of the whereabouts of the standard systolic and diastolic pressure levels. These are as follows: The systolic pressure is the point where the first distinct sound is heard during decompression and *the diastolic pressure is the point where the loud clear sounds abruptly drop in intensity and suddenly become dull and muffled, or abruptly disappear*. The upper normal blood pressure limits are 160 systolic and 100 diastolic. The blood pressure rises only $\frac{1}{2}$ mm. for each year of life: otherwise stated, age has by no means the importance that was formerly attached to it.

The standard levels are of such primary importance that I do not propose to say much more about the estimation of blood pressure beyond indicating a few cardinal points in technique:—

(1) Apply the cuff on the *inside* of the arm in order to compress the artery against the bone: its application on the outside of the arm is an abortive attempt to bend the bone towards the artery.

(2) So apply the cuff that its lower end lies *immediately* above the bend of the elbow, thus the Korotkow sounds are best heard.

(3) Quickly inflate the armlet to obviate congestion of the arm: slow inflation occludes the veins before the arteries, hence blood continues to enter the limb but is unable to escape with resultant congestion of the arm.

(4) Inflate the armlet to a pressure of 200 mm. lest you miss the silent gap.

(5) Decompress gradually and *at a uniform rate*.

(6) Take at least three to four or more readings until you obtain two concordant readings: the initial reading in nervous subjects is unduly high as compression of the arm is liable to lead to reflex vaso-motor spasm of the brachial artery.

(7) In young hypertensives especially, exclude coarctation of the aorta by palpation of the femoral arteries.

At this year's session of the American Heart Association, Stroud advised the routine taking of blood pressure in both arms. 'For the past eight years', he said, 'I have been taking the blood pressure in both arms of all patients that have come to me, and I can confirm the impression that has been given by this last paper, namely, that there is quite a marked difference in the blood pressure in the two arms in a vast majority of cases.'

The main reason I have taken the blood pressure in both arms is that eight years ago, before the insurance companies had stopped granting total disability insurance, one of Walter Cramp's "all American" football players took out a life insurance containing a total disability clause. His blood pressure was taken by the doctors in the left arm only. His was a \$250,000 policy taken up by three or four companies. This individual had a blood pressure of 120/80 in the left arm. Three weeks after he took out this policy, a cardiac infarct developed while he was playing golf. I saw him six weeks after this infarct occurred, and at that time he had a blood pressure of 120/80 in the left arm, but a pressure of 200/110 in the right arm. Presumably then, if these companies doctors had taken the pressure in both arms, this gentleman would not have been living in Santa Barbara for the last eight years on his income from his total disability insurance'.

Dr. Stroud's advice is a counsel of perfection to the busy general practitioner who may be not unjustifiably content with an accurate reading in one arm.

RADIOGRAPHY OF THE HEART AND AORTA

The modern routine examination of a heart case includes clinical, electrocardiographic and radiological investigations. In Indian medical centres electrocardiography is a rightly established procedure. Cardiovascular radiology, however, has not yet come into its own, probably because the profession is not quite aware of the fact that precordial percussion has been almost entirely abandoned at home on the grounds that it is a demonstrably unreliable procedure excepting in that it may reveal pulmonary emphysema or pericardial effusion. The traditional clinical methods of estimating cardiac enlargement by percussion of the heart fell into complete disuse about 1936 when John Parkinson's radio-cardiological studies disclosed the gross inaccuracies inherent in this time-honoured procedure. In the first Lumleian lecture for 1936 John Parkinson made some trenchant remarks on the percussion method of studying cardiac enlargement. 'The inaccuracy of percussion', he said, 'is inseparable from a method which is indirect and inferential: and this is now generally admitted. No longer shall we tell of the professor who by knocking at the front door could find out who was in the drawing-room. As a final effort to resuscitate a dying

(Continued at foot of next column)

PELLAGRA

By L. EVERARD NAPIER, M.R.C.P. (Lond.)
Professor of Tropical Medicine
Calcutta School of Tropical Medicine

INTRODUCTION

THIS note was prepared in order to draw attention to this disease. If medical officers in India were more familiar with the signs and symptoms of pellagra, it is probable that far more cases would be diagnosed; I am therefore giving a short description of the disease as it is usually encountered*.

HISTORICAL

Pellagra is a disease with a considerable historical background. It was mentioned first in the seventeenth century as occurring in Spain and in 1735 it was described accurately by Gasper Casal.

His book was not, however, published until 1762. Figure 1 is a reproduction from this book (Major, 1932). Meanwhile M. Thiéry described the disease in the *Journal de Médecine, Chirurgie et Pharmacie* (Paris, 1755) acknowledging his debt to Casal.

*This note is followed by two clinical reports, one on the findings in the five cases that were admitted to and treated in our hospital recently and the other a report on pellagra in the Kangra valley by another writer.

(Continued from previous column)

method which is packed with fallacies and imperfections, there have been attempts to square the results of percussion with those of radiology, but they have led to nothing. The best proof that it (cardiac percussion) is to be extruded from our important and growing number of clinical and laboratory methods is the fact that it is sterile. The tokens of sterility are upon it. Nothing has been added to medical knowledge or progress through cardiac percussion since the beginning of this century, and in the light of x-rays it will shrink into obsolescence'. It has, 'x-rays', he continues, 'tells us literally everything that percussion can tell us and tell it more amply and precisely'. 'More faithful witnesses are eyes than ears'.

I acknowledge my great indebtedness to the writings of British, American, Continental and other cardiologists past and present. My gratitude to my teachers, more especially to Dr. Evan Bedford, is certainly not less. In conclusion I would strongly advise those who wish to keep abreast of the times in the matter of clinical heart disease to add to their library the new official mouthpiece of the Cardiac Society of Great Britain and Ireland, the *British Heart Journal*. 'As the calorimeter tells the activity of the patient's metabolism, so you may determine the plus or minus activity of the local profession in any district by the condition of its library'.—Harvey Cushing.

The following is an extract from this description :—

Description of a Malady called mal de la Rosa

Among a large number of complications which accompany this disease, there is one which characterizes it and makes it very easy to distinguish. This is a horrible crust, dry, scabby, blackish, crossed with cracks, which causes much pain to the sufferer and throws off a very fetid odour. This crust may be upon the elbows, the arms, the head, the abdomen, etc. But the people of Asturias, where this disease is endemic, do not give it the name of *mal de la Rosa* unless it is located exactly on the metacarpals or metatarsals of the hands or of the feet; and following them in this restriction I am going to write in a few words the history of this disease.

It commences ordinarily towards the spring equinox, more rarely at other seasons. In the beginning it is nothing more than a simple redness accompanied by roughness. It degenerates later into true crusts such as we are going to describe. They dry up ordinarily during the summer, and the affected metacarpus or metatarsus is completely rid of its crusts or pustules. There remain red and shiny marks, very smooth, and denuded of hair, more sunken than the neighbouring skin, resembling somewhat those scars which burns leave after they are cured. It is probably the red and glossy colour of these marks which has given to this disease the name of *mal de la Rosa*. These scars, besides, in those who have been affected for a long time with this kind of illness, last their entire life; and every year at spring time they become re-covered with new crusts which become more horrible from year to year. They do not always involve the two hands; sometimes one sees them on one hand alone and on one foot; sometimes on two hands and on one foot. It happens also that they involve all at once both hands and both feet. They do not extend to the palms of the hands or the soles of the feet; they involve constantly the back, either extending thus over the entire metacarpals or metatarsals, or they cover only a slight portion.

There is another very remarkable sign of this disease, which, in truth, is not essential to it, because it is not always present; but, as it is never observed in other diseases except this one of which we speak, we may regard it as an accompaniment. This symptom is another crust of an ashy and jaundiced colour, which involves the anterior and inferior portions of the neck, extending out from here and along the clavicles and the superior extremity of the sternum, forming a band as wide as two fingers. It rarely covers the entire back of the neck; most often the middle portion of the trapezius muscle remains free, and prevents this collar from making a circuit of the neck, but, in revenge, it forms ordinarily on the sternum a lesion of the same kind and the same size which extends the length of this bone to the middle of the thorax. This malady does resemble the collar of an order, which renders the Asturian, thus unfortunately affected, very easy to distinguish from all of his fellow citizens.

So singular a disease ought to be without doubt accompanied by peculiar symptoms. Independent of the horrible crusts of which we have just spoken, the patients are attacked by a perpetual shaking of the head and indeed of all the upper part of trunk. This trembling is often so marked that they can scarcely keep on their feet. We have seen a woman in the hospital whose head and trunk trembled so as to resemble a reed continually shaken by the wind. She could not hold herself upright without changing every moment the position of her feet, holding thus by instinct the equilibrium which this perpetual trembling caused her to lose. The patients have further a painful burning of the mouth, vesicles upon the lips and they have a dirty tongue. They complain of extreme feebleness of the stomach and of all of the body, principally the thighs, and of a heaviness which takes away from them all activity. At night they feel a

burning which often deprives them of slumber. The bed is then insupportable to them because of the heat, but they do not feel better with cold; the slightest degree of cold or of heat is equally insupportable to them. They are sad and melancholy: one sees them shedding tears and emitting cries without any object, although otherwise they seem to possess their reason. They claim that they are compelled to in spite of themselves by the nature of their illness. These symptoms besides are common to all. And here are a few of them in detail. Slight delirium, a certain stupidity, loss of certain senses, of taste and of touch principally, crusts, ulcers, erysipelas in different parts, irregular fevers, restless slumber, the skin entirely discoloured, and elephantiasis to a slight degree.

This disease is terminated most commonly by hydrops, by lymphatic or scrofulous tumours, and by marasmus. It has also another termination but it does

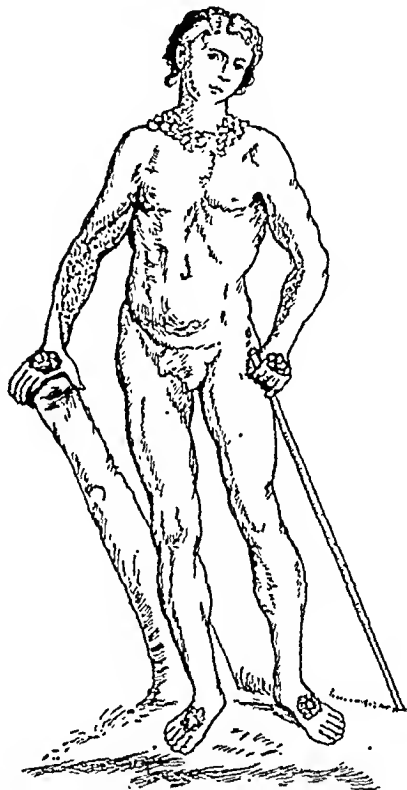


Fig. 1.—Patient suffering from *mal de la Rosa* (pellagra).
From Casal's *Memorias de Historia Natural de Asturias* (1762).

not happen indifferently at every season. This is the mania into which these unhappy sufferers fall towards the summer solstice. This mania is not ordinarily severe but however it deranges the mind of the patients and forces them to leave their dwellings and to save themselves in solitude where the excess of *ennui* and of illness throws them sometimes into great depression. It should be remarked that this maniacal melancholia which follows at the height of summer in those who are affected by the *mal de la Rosa* are much more terrible, and more commonly mortal than those of which have another origin. Without doubt because these are produced by metastasis to the brain of the acrid and malign humour which produced this malady. But what is its nature? If one wishes to describe with care the symptoms which we have described one would not be far from thinking that it is a mixture of leprosy, tetter and of scurvy which constitutes a disease of a peculiar and definite type which has its proper and constant symptoms. This malady has never been described as far as I know, and does not exist perhaps

elsewhere with as much violence as in Asturias, especially those of Oviedo: for the Asturias of Santillana are more healthy by the nature of the soil, by the quality of the air, and of the food. . . .

* * *

M. Casal, physician of the Court, who adds to a taste for observation all the frankness of the earlier times, who has practised medicine in Asturias for 25 or 30 years and from whom I take the history which I have just read; this wise observer, I say, assures me that the *mal de la Rosa* has always resisted all remedies, and that he regards it as incurable. Moreover he cites the example of a woman of the people who, during one of the melancholy deliriums so frequent in this disease,



Fig. 2.—Patient showing pellagrous dermatitis on extensor surfaces of arms and forearms, on the backs of the hands, and on the dorsa of the feet.

had a great desire to feed herself from cow's butter, for which she spent all of her property, and she was cured.

In 1776, pellagra assumed serious proportions in Italy and legislative action was taken to control the sale of maize on this account. A century later Lombroso, an Italian worker, again incriminated maize as the cause of the disease, but suggested that it was due to a special maize toxin developed during storage and as a result of action taken by the local authorities by 1900 the disease incidence in that country had fallen from 4,000 to 100 deaths per annum.

Attention was first drawn to it in America in 1907 and in 1916 as many as 150,000 cases with 15,000 deaths were reported in the United States.

Cases have been reported in England, where it is an institutional disease and in southern Europe, Egypt, South America, and elsewhere.

In India, the first series of cases was reported by Lowe (1931) who had found about 40 cases amongst the inmates of Dichpali Leper Hospital, Hyderabad, Deccan. Isolated cases have been reported from time to time from different parts of India and it seems probable that the condition is widespread in this country although it apparently never assumes epidemic proportions.

EPIDEMIOLOGY

Pellagra is seen in its most characteristic form in poor populations whose staple diet is maize. It does also occur in countries where maize is not the staple diet, and sporadically amongst people who do not include maize or maize flour at all in their dietary. However, when it occurs amongst the latter class the diet is nearly always found to be poor, monotonous, and of low protein and vitamin content.

In more prosperous countries it occurs mainly in institutions and in prison camps where the food is scarce and deficient in variety. It very rarely occurs amongst people on a good mixed diet, but it has been reported in patients who have been placed on a restricted diet for medical reasons and who have continued this diet for long periods without reference to their medical advisers.

Finally, it has been reported amongst alcoholics; the ætiology in this case is not clear, but it is probably associated again with a low dietary intake—common amongst alcoholics—or to a lowered absorption through the associated gastritis.

The disease shows a definite seasonal incidence, though the season is different in different countries, it is constant in any one country. In cool countries it occurs in the summer and autumn, and in hot countries in the cooler months of the year. The explanation of this apparent anomaly is that sunlight plays an important part in the ætiology; in the former countries there is more sunlight in the summer months, and in the latter people tend to avoid the sunlight in the hottest months whilst exposing themselves in cooler months. It is noticed that people susceptible to the disease suffer from an exacerbation of symptoms at the same time each year, but that in a pellagra-endemic area there are 'bad' years and 'good' years.

It is far more common amongst outdoor workers, agricultural labourers in particular. Hard work is a contributing ætiological factor. Generally, therefore, the disease is more common amongst men, but in India it appears to be more common amongst women.

It occurs at all ages, from three months to a hundred years.

ÆTIOLOGY

The exact ætiology is not yet understood fully, but during the last few years much has been done on the subject, and many definite facts

have been established. The current theories regarding the aetiology can be classified as follows :—

The maize infection theory.—It has been suggested that in certain cases maize is, or after defective storing in damp conditions becomes, infected and produces the disease in those who consume it, directly, or indirectly by interfering with absorption or by causing decomposition. Though the disease appears in epidemic form amongst maize eaters and legislative measures aimed at controlling and improving the storage of maize have apparently reduced the incidence in the past, the disease is never transmitted to people on a good diet, and there is little, if any, experimental support for this theory.

The maize toxin theory.—The neurological changes that occur appear to be of toxic rather than bacterial origin, and support has recently been given to this theory by the occurrence of pellagra amongst individuals taking maize alcohol, but there is no evidence, experimental or otherwise, to indicate the actual nature of this toxin and attempts to isolate it have failed. Further, many people who have never taken maize in their diet suffer from pellagra.

The constancy of the skin lesions and the fact that the general symptoms run parallel to these, improving in the cold and sunless months of the year, for example, has led to the suggestion that a pre-toxin is ingested or formed which is converted into a toxin by the action of the ultra-violet rays.

But Stannus (1937) and Sebrell (1938) are of the opinion that the effect of the sun is purely a matter of trauma, and that the skin in its ill-nourished state is particularly liable to damage, or, to put it another way, the fullest effect of the morbid changes due to pellagra will fall on tissues already damaged by ultra-violet radiation from the sun, by infra-red radiation from a fire, or by friction of the clothes.

Protein deficiency.—This theory is dependent on the fact that all pellagra-producing diets are low in protein content. Maize has a very low protein content compared with other cereals (see table, column 2), and, further, the biological value of the protein is also very low (see table, column 3). The two facts combined make maize a very poor source of good protein (see table, column 4).

Specific protein or amino-acid deficiency.—Maize is defective in protein, quantitatively, qualitatively, and in the variety of protein substance present; there are, for example, certain important amino-acids absent in a pure maize diet, e.g., tryptophane and lysine. It is suggested that some such specific deficiency is the cause of pellagra.

Vitamin deficiency: absence of the PP (pellagra preventing) factor from the diet.—

The PP factor is part of the vitamin-B₂ complex which contains, amongst other things, nicotinic acid, lacto-flavine or riboflavine, and B₆ [anti-dermatitis (rat) factor]. Diets that are

rich in vitamin B₂, such as yeast, meat, and liver extract, rapidly cure uncomplicated pellagra, even in patients who are left on their otherwise pellagra-producing diet.

TABLE

	Percentage protein content *	Relative biological value of the protein *	Relative biological protein value per given weight of substance
Beef ..	22.7	98	100.0
Wheat ..	11.7	67	35.2
Rice ..	8.5	80	30.5
Milk † ..	3.3	85	12.6
Maize ..	4.3	60	11.6

* From Aykroyd (1937).

† The low position of milk, a substance of high nutritive value, is because it is a fluid substance (87 per cent moisture) being compared with solids.

For this theory strong support has been obtained from animal experiment. Dogs fed on

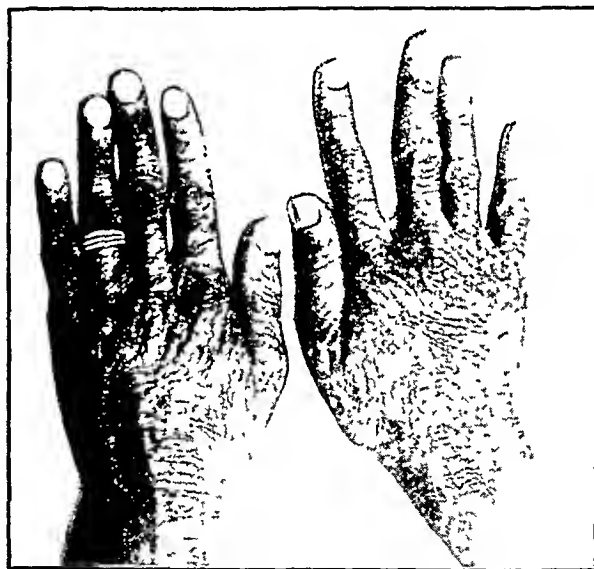


Fig. 3.—Typical pellagrous lesion on the backs of the hands.

a pellagra-producing diet develop a condition known as 'black tongue', which clears up rapidly when vitamin-B₂ complex is added to the diet.

Recent work, which will be referred to in greater detail under treatment, has shown that nicotinic acid is the fraction of vitamin-B₂ complex that is specific in pellagra, as far as the skin and mucous membrane lesions are concerned, but that unless vitamin B₁ is also given there is no improvement in the peripheral neuritis.

It has been shown that the dermatitis which is produced in rats and has been named 'rat

pellagra' also does not respond to nicotinic acid, but improves when vitamin B₆ is given, an observation which proves that this condition is not analogous to human pellagra.

The present tendency is to consider that nicotinic acid is the PP factor, and further that clinical signs and symptoms which do not respond to adequate doses of this substance are not part of the true pellagra clinical picture, but due to associated deficiencies.

There is just one other possibility that should be considered, namely, that there is a toxic factor present in maize and to a less extent in other food substances, which is neutralized by nicotinic acid and by other associated dietary substances, so that it only exerts its influence when



Fig. 4.—Pellagrous lesions on forearms and hands.

these are absent or deficient; in other words, that there is a state of 'conditioned toxicity'.

PATHOLOGY

The skin.—The changes are primarily inflammatory and then atrophic. There is parakeratosis of the epithelial layer, increase of pigment in the Malpighian layer followed by œdema and desquamation, which leaves the surface red, pigmented, and rough. The vessels of the dermis show hyaline degenerative changes.

The nervous system.—There are degenerative changes in the peripheral nerves, cord, medulla,

pons, cerebellum and cerebrum. The lesions are by no means constant, and different observers have described them in different systems. The posterior tracts seem to be more frequently attacked than the lateral tracts. Atrophic changes and pigmentation of the anterior horn cells and of the sympathetic ganglia occur. Mott described the picture as a combined sclerosis of the cord. There is demyelination and Wallerian degeneration of the nerve fibres.

Alimentary tract.—The mucous membrane of the whole tract including the tongue and mouth shows hyperæmia and sometimes ulceration: this is followed by atrophic changes in the mucosa and also wasting of the muscular coat.

Other organs.—There is wasting and brown degeneration of the heart muscle. There is fatty degeneration of the liver and kidneys, and atrophy and focal necrosis of the spleen. The supra-renals show atrophic changes in both cortex and medulla and occasionally hæmorrhages.

Blood picture.—Anæmia is the rule: it is said to be usually of the microcytic type and to be associated with leucopenia.

Biochemical findings.—There is a marked increase in coproporphyrin in the urine which disappears when successful treatment is given.

There is usually achlorhydria or marked hypochlorhydria; but Castle's intrinsic factor is present in the secretions (there is at least no evidence of its absence in the blood picture).

SYMPTOMATOLOGY

The onset may be either with dermatitis or gastro-intestinal symptoms, but in other cases pain and difficulty in swallowing hot or spicy foods are the first symptoms noted; the case histories in any particular group of cases are usually similar. There are periods of improvement and then of relapse, and it is usually noted that both the onset and the periods of exacerbation occur at the same season of the year.

Dermatitis.—The skin lesions, which are usually symmetrical, suggest sunburn at first but the hyperæmia does not clear up; then large scales form which may separate and leave a red pigmented rough area.

The distribution of the skin lesions is typical: in 77 per cent of cases they appear on the backs of the hands: other common areas are on the extensor surfaces of the forearms and arms, on the dorsa of the feet (where these are exposed to the sunlight), on the shoulders, on the back of the neck, and on the malar eminences; these are the areas that are most affected by sunburn. Other sites are the genitals and axillary folds, especially when these areas are subjected to pressure of clothing. The facial lesion often takes the form of a symmetrical butterfly rash. Typical lesions are shown in figures 2, 3 and 4.

Intestinal tract.—The attention to the mouth is first attracted by difficulty in taking hot and spicy foods. The tongue is œdematous; at first

red and swollen, it then loses its epithelium and takes on the characteristic glazed appearance: there is a general inflammatory condition of the whole tongue and mouth, with aphthous ulcers along the edge and on the frenum of the tongue. There is increased salivation. The pharynx becomes involved in the same process. This leads to difficulty in swallowing and disinclination to take food soon follows.

Later, the tongue may become completely denuded of epithelium, atrophied and fissured.

The bowel symptoms are not by any means constant, but there is often a troublesome diarrhoea of the enteric type. There is usually discomfort in the upper abdominal segment after food and later a persistent burning pain is complained of: there is evidence of gastritis which is associated with specific malnutrition of the mucous membranes generally, and is in keeping with the constant hypo- or achlorhydria.

General and nervous.—Tremors of the tongue and face muscles are noted early in the disease, Chvostek's sign (a spasm of the facial muscles on tapping) has been noted; later, this extends to other muscles; there are fleeting pains in different parts of the body, numbness and paraesthesias; the reflexes are exaggerated in some cases and there is a spastic rigidity, but in others they are lost. Peripheral neuritis is often very troublesome, but recent work tends to suggest that this is an associated condition.

Later, mental changes are a characteristic symptom of the disease: there is dullness, headaches, confused thought, insomnia, depression amounting to melancholia which often leads to suicide. In some cases a manic-depressive syndrome has followed periods of excitement with hallucinations.

Other signs and symptoms.—There is often irregular fever, but it is not a constant symptom nor is it probably associated with the central pathological and symptomatic syndrome. Anaemia is usually noted: this has been mentioned above.

Prognosis.—This will naturally vary with the circumstances. If the patient, even in an advanced stage, can be placed under ideal hygienic and dietetic conditions treatment is usually easy and in most cases will end in complete cure, but there may be a relapse when the patient returns to his previous mode of life. The disease, however, usually occurs amongst poor populations where the intensity of the symptoms will vary according to the degree of the dietary deficiency, and the usual history is that of improvement during the cold months of the year (in sub-tropical climates) with progressive relapses during the summer months.

The death rate in Italy is given as 3 to 5 per cent, but in some outbreaks in America it has been placed as high as 30 per cent.

In alcoholics and in chronic malarial and dysenteric subjects the prognosis is bad.

Diagnosis and differential diagnosis.—There are no specific laboratory tests, but the increase of porphyrin in the urine when it occurs is suggestive and recent work suggests that response to nicotinic acid constitutes a specific therapeutic test. Otherwise the diagnosis depends on the history of the locality and diet, the chronicity and seasonal variations, and the characteristic clinical syndrome. The semi-popular diagram, adapted from Gregory (1938), may be of some help for memorizing the outstanding points, but in it no account is taken of the stomatitis.

It has to be differentiated from sprue (more constant macrocytic blood picture, less constant achlorhydria, and fatty stools), other dermatitis (simple solar, trade, and syphilitic), lupus

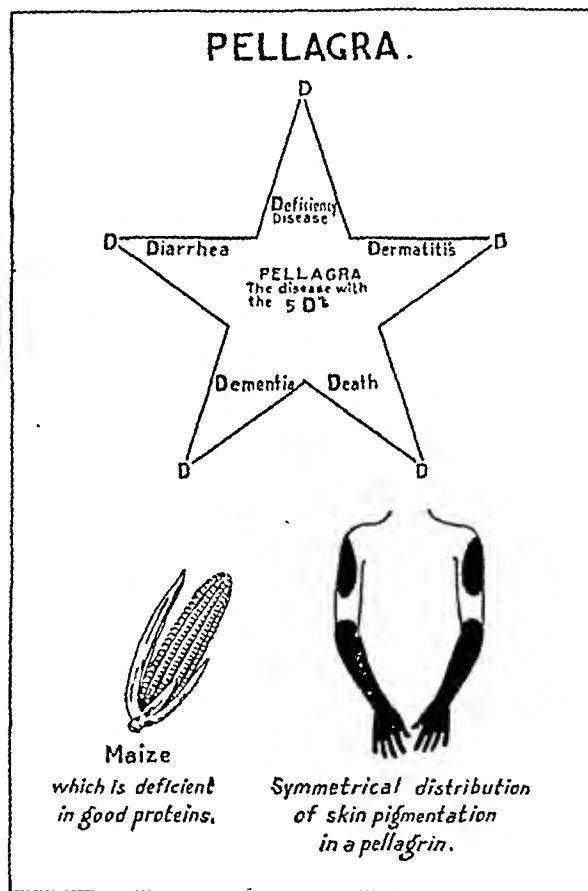


Fig. 5.

erythematous, tabes and general paralysis, beriberi, ergotism, and lathyrism.

TREATMENT

If the aetiology of pellagra presents any difficulties, the treatment certainly does not, in as far as the treatment of the individual moderately advanced case is concerned. The real difficulty arises in the treatment of large poor populations and here the problem becomes an economic one.

The treatment is dietetic and symptomatic. The patient should be removed from the unsatisfactory surroundings, put to bed in hospital or

under good home nursing conditions, and given a good mixed diet, 20 per cent above his normal caloric requirements, in which there is plenty of milk, meat (if not taboo), eggs, whole wheat meal, vegetables, and fresh fruits. The ration of vitamin-B₂ complex should be augmented by the addition of yeast, as a dry powder or, in cases where yeast is not well tolerated, of liver extract which can be given parenterally when intestinal absorption is poor.

Drugs do not form an essential part of the treatment and in uncomplicated cases complete cure can be effected without them, but sodium thiosulphate 0.5 gramme daily will help the skin condition, arsenic in the form of Fowler's solution is recommended by some writers, and, if there is a microcytic anaemia ferrous sulphate gr. vi. three times a day should be given.

Most of the symptoms will disappear on the administration of a suitable diet, but, if diarrhoea persists, kaolin, bismuth or even opium should be tried in turn, and, if constipation then supervenes, liquid paraffin should be given nightly. The stomatitis should be treated with a mild antiseptic such as borax and glycerine and, if painful to the extent of interfering with the taking of proper nourishment, cocaine may be added to the mouth application, 2 grs. to the ounce. For the mental symptoms and sleeplessness sedatives may be necessary, such as bromides or luminal.

For the peripheral neuritis vitamin-B₁ concentrates are indicated.

Specific treatment.—The diet which has been recommended is rich in the pellagra-preventing (PP) factor. Recent investigations have identified this factor with nicotinic acid which can therefore be given separately by injection or by mouth.

The effect of giving this substance even without altering the diet is dramatic and improvement occurs with amelioration of most of the symptoms and a general sense of well-being within as short a time as twenty-four hours.

The dose recommended by different workers varies considerably, but a good average dose is 500 mgm. daily by mouth for three or four days, though a daily dose up to 1,800 mgm. can be tolerated, followed by 100 mgm. daily as a maintenance dose until all symptoms disappear.

An interesting result of this specific therapy is that it has separated the symptoms that can strictly be included in the pellagra clinical syndrome from the associated symptoms, the most striking example being the peripheral neuritis which does not respond to nicotinic acid and demands the administration of vitamin B₁ (Spies and Aring, 1938). These workers draw attention to the fact that vitamin B₁ is not always absorbed by the stomach and that parenteral injection may be necessary.

It is possible to bring about a cure by nicotinic acid in patients who are still being given a

pellagra-producing diet, but this method is not recommended, as there is an early relapse directly the nicotinic acid is discontinued.

Vilter, Bean and Spies (1938) have pointed out that nearly all pellagrins are suffering from chronic protein deficiency and that complete and lasting cure will not be effected without increasing the protein diet also.

Prophylaxis.—As the disease is a dietetic one, prophylaxis is necessarily an economic rather than a medical problem.

Legislative measures to control the storage and sale of maize have been resorted to in the past in some countries, but are unlikely to be very helpful as there is little evidence nowadays that bad storing of maize is in any way responsible, and it is usually amongst poverty-stricken populations who cannot afford better cereals that maize is used as the staple diet.

In the areas where the disease is endemic, much can be done by education and propaganda. If the people are made to understand the necessity for including certain substances in their diet they will often find the means to provide it. Again, if they are made familiar with the signs and symptoms of the disease and told that these are readily amenable to treatment, they will present themselves for this treatment.

It has been suggested that the introduction of nicotinic acid is an event of economic as well as scientific importance as it provides a comparatively cheap means of supplementing pellagra-producing diets. Schmidt and Sydenstricker (1938), who have tested the prophylactic effect of 100 mgm. of nicotinic acid twice a week, found that this amount did not protect a population on pellagra-producing diet, but Spies *et al.* (1938) reported that daily doses of 50 mgm. would protect some individuals, though larger amounts were sometimes necessary.

Where the question of cost is not paramount, there will be no difficulty in adding substances rich in the PP factor to any diet, non-vegetarian, vegetarian, or even invalid.

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NOTES ON CASES OF PELLAGRA ENCOUNTERED IN CALCUTTA

By P. C. SEN GUPTA, M.B.
M. N. RAI CHAUDHURI, M.B.
R. N. CHAUDHURI, M.B.

and

L. EVERARD NAPIER, M.R.C.P. (Lond.)

Department of Tropical Medicine, Calcutta School of
Tropical Medicine

PELLAGRA is a disease that occurs sporadically in many places in India. At the Calcutta School of Tropical Medicine we see probably 6 to 12 cases a year. The patients usually attend the skin diseases out-door clinic. The following five patients who had been referred to the department of tropical medicine consented to come into hospital for more complete investigation than is possible in the out-door department :—

Pellagra cases

Case 1.—Mrs. R. N. B., Punjabi Hindu female, 36 years old, vegetarian, admitted on 18th January, 1937, for symmetrical dark pigmentation of both upper and lower extremities, gradual weakness—duration six months, amenorrhœa—duration four months, and diarrhœa.

On examination the patient was found to be of thin build; she had pyorrhœa and pharyngitis; her tonsils were healthy, and her tongue clean and normal in appearance. Her temperature was normal and her pulse rate 100 per minute. Her heart was normal in size; the pulmonary second sound was accentuated; the lungs did not show any abnormality; and the liver and the spleen were not enlarged.

The skin of both hands, forearm and the back of the elbows and of both legs and feet showed a dark pigmentation and were very rough.

Laboratory tests

Blood counts.—See table. The Wassermann reaction was positive. The aldehyde and antimony tests and van den Bergh tests were negative, and no malarial parasites or microfilaria were present. The urine showed a trace of albumin, but no casts.

Her stools showed no protozoa, helminthic ova or pathogenic bacteria.

Gastric analysis was done on 4th and 8th February and showed complete achlorhydria, even after injections of histamine, and achylia.

Treatment.—The patient was at first treated for her diarrhœa with astringents and for dermatitis with local applications of Lassar's paste and later liniment of calamine. This had little effect. She was running a low fever. She started severe vomiting on the 29th January and was transferred to the charge of the senior writer. With restrictions of diet and gastric sedatives the vomiting stopped. The patient was next put on marmite 3iii daily and thyroid extract gr. i every morning. After gastric analysis had been done, the patient was put on dilute hydrochloric acid and pepsin mixture; she was kept on this regime for about three weeks.

Progress.—The diarrhœa gradually subsided, the temperature came down to normal and the pigmentation began to clear up within a few days of starting this treatment. Blood examination on 24th February showed hypochromic anæmia, so she was given a course of ferrous sulphate, gr. xviii daily, for three weeks. Her anæmia was cured within a month of starting ferrous sulphate, all patches of dermatitis had disappeared and the patient had gained 8 lb. in weight before she was discharged on the 24th March, 1937.

As the Wassermann reaction was positive and there were bilateral tubo-ovarian masses present, the patient

was instructed to undergo treatment at the out-patients' department for these conditions.

Remarks.—The skin lesions in this patient were typical, but though she was dull and unresponsive it was not possible to say that her mental condition was in any way abnormal. Her blood picture was still microcytic and hypochromic, but her hæmoglobin was up to the normal average of her class at the time of discharge.

Case 2.—D. C., Bengalee Hindu female, aged 35 years, admitted on 2nd June, 1937, for upper and lower extremities : : two months. The dermatitis started as small papules on the toes, spreading upwards, with discharge and exfoliation.

On admission, the patient was anæmic and there was œdema of the legs. There was exfoliation of the skin around the mouth with pigmentation, the teeth and mouth were very unhealthy and the tongue was red and sore. She had low fever and her pulse was 110. Her heart and lungs showed no abnormality, the liver was tender, the descending colon was thickened and tender, and the spleen not palpable. No other abnormality was detected.

Laboratory tests

Urine showed a faint trace of albumin, a few pus cells were present; no casts seen.

Stool.—Cysts of *Giardia* and *Entamoeba nana*; no pathogenic bacteria were isolated on culture, and there were no ova.

Blood.—Wassermann reaction was weakly positive, the van den Bergh test was negative (also see table).

Gastric analysis on 28th June without histamine showed complete achlorhydria; peptic digestion—nil.

On 3rd July after histamine, N/10 HCl = 0, 0, 9, 26, 43, 40, 34, 12, 0 in the consecutive estimations, at fifteen-minute intervals, histamine being given after the second sample had been taken.

Treatment.—The patient was put on marmite 3iii daily, and local treatment (liniment calamine). She was given bitters and alkalies, and dilute hypochloric acid with pepsin later (after gastric analysis had been done) for her gastric condition, and an eight-day course of stavarsol for lamblia infection.

Result.—Stomatitis and diarrhœa disappeared soon after she started taking the acid mixture, and the dermatitis gradually subsided. The patient's general health improved (she gained 16 lb. in weight during her stay in hospital) and her anæmia also improved considerably.

Case 3.—R. D., Sikh female, aged 50 years, vegetarian, was admitted on 14th March, 1938, for (1) symmetrical pigmentation of the hands, arms and legs—duration ten days, and (2) indigestion, flatulence and diarrhœa—duration two months.

On admission the patient showed signs of loss of flesh, the tongue was furred and the teeth were unhealthy (decaying and tartar + +). No abnormality was detected in the heart, lungs, abdomen or nervous system. No history of consumption of maize.

She had immature cataracts in both eyes.

Laboratory tests

Routine examinations of urine and stools showed no abnormality. The Wassermann reaction was negative; the van den Bergh test was negative.

Gastric analysis.—

18th March, 1938—complete achlorhydria and achylia.

23rd April—after histamine—complete achlorhydria.

Blood counts.—See table.

Mantoux test—0.00001 c.cm. ++.

Treatment.—The patient was put on marmite 3vi daily and dilute hydrochloric acid 3ss. with glycerine pepsin 5i, twice daily after food.

Result.—Within ten days the stools became quite normal and the dermatitis was subsiding. The patient's

general health and the blood picture improved very much—she gained 10 lb. in weight and all her symptoms subsided before she was discharged on 26th April.

Case 4.—R. T. J., Nepali Hindu male, aged 55 years, a comparatively well-to-do lawyer, was admitted as a paying patient on 8th April, 1938, for patches of dermatitis in different parts of the body for one year, and soreness of the tongue.

The patient had suffered from asthma for 24 years. He had small patches of dermatitis on both ankles for some years; these appeared and disappeared intermittently during these years. Since March 1937, the dermatitis had spread to his legs, knees, hands and face. He developed a patch on the chin in March 1938 and some patches on the forehead soon after. He had had soreness of the tongue for a long time, but this had increased during the seven weeks preceding his admission into hospital, and he could swallow only liquid food. He gave a history of taking a considerable amount of alcohol.

On admission.—He was found to be slightly anæmic. He had patches of dermatitis on his ankles, knees, thighs and hands, more or less symmetrical in distribution, and there were patches on his chin and forehead. The tongue was denuded of epithelium, red and sore. His lungs showed signs typical of asthma and the heart sounds were muffled by the wheezing ronchi. The liver was palpable and tender. No other abnormality was detected, except in his mental condition which was not normal.

Laboratory tests

Urine—no abnormality.

Stools—no abnormality at first but later, when the patient had an attack of dysentery, macrophages, red blood cells, pus cells and vegetative *E. coli* were present.

Blood.—Microfilaria were present in the blood; van den Bergh indirect was positive, bilirubin = 0.8 units.

Agglutination (when the patient had dysentery) against Flexner-Y + 1/100. Shiga—negative.

The Wassermann reaction was negative.

Blood count.—See table.

Gastric analysis.—

12th April—achlorhydria, no peptic digestion.

22nd April—after histamine. Free HCl = 0, 0, 0, 4, 6, 4, 6, 0 in consecutive samples. Partial peptic digestion.

Treatment.—The patient was put on campolon 2 c.cm. daily for ten days, marmite 5vi daily, local application of liniment of calamine, besides expectorants for his cough. After the gastric analysis, he was put on dilute hydrochloric acid and pepsin.

Result.—The skin condition started to improve within a few days. By the time the campolon injections were finished the mental condition showed very marked improvement. The general health also improved and he gained 6 lb. in two weeks. After this the patient had an attack of influenza and, later, an attack of bacillary dysentery. This reduced his weight by 4 lb., but the skin condition and stomatitis continued to improve and were completely cured before he was discharged on 7th May.

Remarks.—An unusual feature of this case was that he had typical pellagra patches on the inner sides of his knees which puzzled us at first until he improved in health when one morning we found him sitting on his bed with his legs crossed and his thighs abducted and everted, so that the patches would have been fully exposed to the direct rays of the sun had he been sitting in the open. He admitted that this was how he sat most of the day.

The other point was the extremely rapid improvement in all his symptoms, including his mental condition.

Case 5.—B. N. S., a Bengalee Hindu male, aged 35 years, a poor cultivator, non-vegetarian, was admitted on 18th January, 1935, for pigmentation of the skin, soreness of the tongue and ulceration at the angles of the mouth, anæmia and oedema, gradual weakness—duration two years. Abdominal pain and diarrhoea—duration eight days. The patient had had an attack of dysentery two years before.

On admission.—The patient was found to be anæmic. There was some degree of proptosis and the patient had a starved look. The hair and the eyelashes were greyish-white in colour and there were patches of pigmentation on the limbs and over the body. There was excoriation and slight ulceration at the angles of the mouth: the tongue was ulcerated. There was oedema of the legs. His mental condition was dull generally, but he was irritable and obstinate at times. The teeth and gums were unhealthy, his tongue denuded, red and sore, and the pharynx was congested. The lungs showed signs of bronchitis. The heart was slightly enlarged and hæmic murmurs were audible. The liver and the spleen were not palpable. The colon (ascending and descending) was thickened. The knee jerks were exaggerated.

Laboratory tests

Urine and faeces.—No sugar or albumin, and no pathogenic organisms or helminthic ova were present.

TABLE

Case	Date	Hæmoglobin in grammes per 100 c.cm.	Red cells in 10 ⁶ per c.mm.	Reticulo-cytes per cent of red cells	Cell volume per cent	MCV	MCH	MCHC	Leucocytes per c.mm.
1	24th Feb., 1937	9.1	4.29	0.2	31.6	73.6	21.1	28.7	9,200
	3rd March, "	11.0	5.04	5.0	34.9	69.2	22.8	31.6	..
	15th " "	12.5	5.46	0.9	38.7	70.9	22.9	35.0	..
	22nd " "	13.1	5.47	0.2	40.9	74.7	23.9	32.0	..
2	25th June, "	..	2.50	..	..	..	..	..	4,800
	13th July, "	10.6	3.6	2.2	36.3	101.4	29.4	28.9	7,050
3	15th March, 1938	11.4	3.6	0.2	38.7	107.5	31.7	29.6	6,700
	11th April, "	14.6	4.48	0.1	41.96	93.7	32.5	34.8	14,800
4	9th " "	11.83	4.01	0.2	33.88	87.2	29.56	33.9	10,500
5	21st Jan., "	8.4	2.67	1.2	26.2	97.9	31.3	32.2	4,050
	21st Feb., "	11.8	4.36	0.3	35.7	81.9	27.1	33.1	9,200
	11th May "	9.5	3.44	0.1	31.0	91.2	27.9	31.9	6,600

Blood.—The van den Bergh test was negative. Wassermann reaction was doubtful.

Blood count.—See table.

Sputum.—No acid fast bacilli.

Basal metabolic rate.—plus 38 per cent.

Gastric analysis.—Achlorhydria, even after histamine; peptic digestion—nil.

Treatment.—The patient was put on marmite 5vi daily and dilute hydrochloric acid and pepsin mixture twice daily after meals, in addition to symptomatic treatment for bronchitis and diarrhoea.

Progress.—The oedema persisted though the looseness of the bowels, the dermatitis and sore tongue slowly improved; the amount of urine passed was very small (16 to 20 ounces). Injections of salyrgan were given in order to remove the oedema and promote better flow of urine. This was successful to a great extent.

After a month the blood condition had improved markedly, the pigmentation was much less, and the stomatitis had disappeared. After the second month of treatment, the hair had grown darker and the pellagra dermatitis was present only in one small area on the left leg. The amount of urine passed daily was however very small and salyrgan had to be continued. The patient's blood condition had received a setback, so he was given a course of ferrous sulphate. This led to slight improvement.

The symptoms were gradually relieved with this treatment. The patient suffered from an attack of acute bronchitis and another of phlebitis of the right femoral vein during the next two months. The improvement was very slow and some degree of mental change remained. The patient, however, had always been somewhat abnormal mentally long before he suffered from the present attack.

Summary

Three were women and two were men. None was indigent, but four were from poor families and one was comparatively well-to-do; this last man was an alcoholic.

The only unusual symptom was that one patient's hair was a light brown, almost straw colour; it recovered its natural dark brown colour during treatment.

The incidence of cardinal signs of the disease is shown below:—

Case	Dermatitis	Stomatitis	Diarrhoea	Mental symptoms	Achlorhydria
1	+	—	+	?	++
2	+	+	—	?	+
3	+	—	+	?	++
4	+	+	—	+	+
5	+	+	+	+	++

The fractional gastric analysis showed achlorhydria in all five cases, in three even after histamine.

All were anæmic, in one case the anæmia was persistently microcytic (even after treatment), in two it was normocytic, and in two macrocytic.

All improved rapidly on hospital diet and marmite. In one case campolon was given as the patient wished to leave hospital early, and the recovery was dramatic in its rapidity. In no case was nicotinic acid given as this substance did not become available in India until the last of these cases was already under treatment.

A NOTE ON PELLAGRA WITH SPECIAL REFERENCE TO THE DISTRICT OF KANGRA (PUNJAB)*

By NAND LAL BAJAJ, L.S.M.F.

In charge, Civil Dispensary, Kangra

PELLAGRA is a very important disease in India and particularly in this part of the country, namely, the Kangra valley. My object in reporting these few cases is to stimulate interest in the subject.

Space will not allow a full discussion of the aetiology of this disease, but it is universally acknowledged to be a dietetic disease. The main dietary deficiencies associated with it are good quality protein and vitamin B₂, the pellagra-preventing vitamin. The disease is common amongst maize eaters, as maize provides a poor protein with certain important amino-acid deficiencies.

The cases reported below bring out certain of the important points in the aetiology, symptomatology, and treatment of this disease. In every case the patient gave a history of eating corn bread.

Case 1.—Hindu female, aged 50 years, a member of a poor peasant family, was admitted on 16th March, 1937, complaining of:—

- (i) Disfigurement of the hands and feet.
- (ii) Soreness of the mouth.
- (iii) Indigestion.

Duration—one year.

Present condition.—Dorsum of hands, feet and extensor surface of the lower parts of the forearms and legs cracked here and there, with some pigmented and depigmented patches over them. Skin slightly thickened. Some smarting felt by the patient at times over the affected parts. Epithelium absent from the dorsum of the tongue to a great extent. Ptyalism marked. Pallor marked.

Treatment.—(i) Sodium thiosulphate 10 per cent solution, 10 c.cm. intravenously daily. (ii) Potassium permanganate gargles. (iii) Acid, iron and arsenic tonic mixture. (iv) Campolon injection every other day. (v) 'Yeast vite' tablets 4 per day. (vi) Wheat bread, milk and dāl.

Meat and egg refused.

Progress.—On 23rd March soreness of mouth decreased a good deal, so also pigmentation and scaliness.

On 29th March soreness of mouth decreased a good deal, so also pigmentation and scaliness.

Result.—Patient did not show much improvement in her local or general condition by the short-lived treatment. Discharged on 31st March, 1937.

Case 2.—Hindu female, aged 25 years, wife of an extremely poor farmer, was admitted on 10th March, 1938, complaining of:—

(i) Frequency of stools with blood and mucus, and griping in abdomen.

(ii) Dyspnoea: duration 2 years.

(iii) Cracked and pigmented condition of back of hands, upper surface of feet: duration 3½ years.

(iv) Salivation and swelling below the lower jaw; duration 2½ years.

(v) Slight loss of control over speech; duration 9 months.

(vi) Swelling of abdomen, feet and face; duration 6 months.

Present condition.—Condition of hands and feet typical of pellagra. Severe anæmia with hæmic murmur heard all over the heart area. Enlargement of both the submaxillary and sublingual glands due to stomatitis and some glossitis. Speech somewhat falling in character, patient stating that she could not articulate and pronounce words as she desired to do; sometimes even quite a different word uttered contrary to her intention. Œdema of feet, puffiness of face. Some fluid in abdomen. Traces of albumin in catheter specimen of urine.

Treatment.—(i) Marmite 5v *ter in die*. (ii) Sodium thiosulphate intravenously as above. (iii) Calcium and parathyroid tablets two a day, for a few days only. (iv) Metatone 5ii *t.i.d.* for a few days. (v) Neo-hepatex intravenously—20 c.cm. in all. (vi) Iron tonic mixture as above but started before metatone. (vii) Whitfield's ointment (salicylic acid and benzoic acid 4 per cent each) for hands and feet. (viii) Chromic lotion, 1 per cent paint, for stomatitis daily for some days.

Diet.—Mostly milk for the first three weeks, later wheat bread and some vegetables and curd added.

Progress.—13th March. Swelling of the face and hands, etc., decreasing.

20th March. Appreciable improvement in general physique. Scales vanishing, and salivation and frequency of stools decreasing.

28th March. Improving steadily.

4th April. Feels markedly relieved. Only two or three stools, free from blood and mucus, a day. Condition of skin of hands and feet nearly normal in appearance.

Patient showed marked improvement in general and local condition. Diarrhœa vanished towards the end and patient may for all practical purposes be regarded as cured.

9th April, 1938. Discharged.

Case 3.—Hindu female, aged 27 years, husband in forest service. Fairly poor. She was admitted on the 6th April, 1937, complaining of:—

(i) Soreness of the tongue and inside of cheeks; duration—5 months.

(ii) Gurgling and pain in abdomen with occasional diarrhœa: duration—1 month.

Present condition.—A few white raised spots on the inner side of the cheeks, mucous membrane red and glazed in patches, mucous membrane of tongue denuded of epithelium over large areas. No enlargement of glands draining the affected parts. Stools rich in undigested food material.

Note.—About one month after her discharge from the hospital as cured, I was informed that the patient had gone insane, and the picture as described to me was more or less one of dementia. She was perfectly cured of this too in six months' treatment and is now absolutely all right.

Treatment.—Sodium thiosulphate, iron tonic mixture, neo-hepatex as above. Potassium chlorate and permanganate for gargles (as a placebo). Two to three raw eggs a day. Green gram 2 to 6 ounces daily. Plenty of milk and less of bread, mostly wheat, no maize at all.

11th April. Feels better than before, gets rectal tenesmus at times.

17th April. Condition of mouth and tongue certainly much better than before.

26th April. Patient feels vastly better and her tongue and mouth appear normal.

1st May. Practically cured.

Result.—Patient discharged cured on 2nd May.

Case 4.—Hindu male, aged 48 years, a farmer, was admitted on 3rd June, 1938, complaining of:—

(i) Extreme weakness with tingling and numbness over the entire body.

(ii) Scaliness and pigmentation of the back of the hands and upper surface of feet and legs extending upwards for a few inches in both the extremities.

Duration—one month.

Present condition.—Clinical features did not reveal any definite organic lesion of the nervous system, the involvement of which might have become manifest should the treatment have been postponed for some days more. Condition of the skin of the hands, etc., was typical of pellagra. History of taking corn bread for prolonged periods.

Treatment.—Neo-hepatex given freely as the patient wanted to leave the hospital very soon. The rest of the treatment consisted of marmite, iron tonic mixture, and avoidance of corn bread, plenty of milk and eggs.

Progress.—6th June. Feels much stronger than before.

10th June. Much better as regards his physical strength and the condition of cutaneous lesions.

Result.—Patient left the hospital on 13th June, considering himself cured as regards his general health which improved wonderfully rapidly although a few scales still could be seen on his hands.

Case 5.—Hindu male, aged 50 years, a zemindar, was admitted on the 1st July, 1938, complaining of:—

(i) An eruption on the upper and lower extremities.

(ii) Tingling sensation and slight numbness of the feet and legs.

(iii) Occasional diarrhœa: duration 3 months of each.

(iv) Pain in shoulder joints: duration 3 weeks.

Present condition.—Slight œdema of dorsum of feet and great bodily weakness due to accompanying anæmia. Cutaneous involvement was quite typical, but it extended from the last finger joints and the last toe joints to well above the elbows and middle of the front of the thighs, respectively. Slight dulling of sensation, particularly the superficial cutaneous of both the lower extremities.

Treatment.—Iron tonic mixture; salicylic acid ointment (4 per cent) for local lesions of the skin; sodium thiosulphate injections; usual diet.

Progress.—3rd July. Patient did not show any noteworthy improvement in his short stay in the hospital.

Results.—Patient could not afford injections of neo-hepatex and left the hospital too early to permit other therapeutic measures to be fully tried.

Case 6.—Hindu female, aged 24 years, wife of a poor shop-keeper, was admitted on the 3rd July, 1938, complaining of:—

(i) Burning pain inside the mouth: duration one year.

(ii) Salivation: duration one year.

(iii) Difficulty in swallowing: duration six months.

(iv) Swelling below the lower jaw: duration six months.

(v) Inability to speak properly: duration six months.

(vi) Amenorrhœa: duration two years.

(vii) Diarrhœa and diminished appetite for several months.

Present condition.—Mucous membrane of the whole of the interior of the oral cavity was red and congested, tongue slightly swollen, papillæ and epithelium gone over the anterior 1½ inches of the dorsum of the tongue. Swelling below the lower jaw consisted of enlarged and slightly tender submaxillary and submental glands. Back of hands and dorsum of feet showed slight pigmentation and cracking. Slight roughness and darkening of skin of the back of the neck and face. Speech slow and slurring. Father-in-law of the patient and her own three children died of prolonged weakness and stomatitis. No history or evidence of venereal disease.

Treatment.—Neo-hepatex 2 c.cm. injections intravenously, 24 c.cm. in all. Nicotinic acid started on 9th July, 1938, as an experiment for the first time, from 30 to 180 mgm. a day orally alternating with 30 mgm. by the intravenous route, the drug thus being administered daily. One per cent chromic lotion locally for

stomatitis. Whitfield's ointment locally. Germinating gram from one to eight ounces a day, curds, 2 pounds of milk, butter. Stale wheat flour bread. Abstinence from corn bread which the patient always took sumptuously and enjoyed. In all 2,100 mgm. of nicotinic acid were given.

Progress.—9th July. Excessive perspiration and pains all over the body, lasting for two or three hours only, followed nicotinic acid injection 30 mgm. intravenously.

12th July. No benefit so far. No untoward effect of nicotinic acid.

22nd July. Shows improvement in all respects.

23rd July. Feels very much better, stomatitis markedly relieved. Again got pains with nicotinic acid injections.

Appearance of skin approaching normal.

Result.—The condition of the affected skin restored to normal. Patient regards herself cured in all respects, though still has amenorrhoea. Tongue still looks glazed over a small patch: speech normal.

Discharged 1st August, 1938.

Treatment.—All cases should be treated in hospital if possible, even moderately severe cases, as it has been found that a prolonged course of treatment is essential to improve the general, as well as the local, condition of the patient. Moreover, changes of environment help a good deal in the cure.

Diet.—Maize should be totally forbidden. Substances containing protein of high biological value and high vitamin-B₂ content are essential for the patient.

For detailed information regarding the nutritive value of Indian food substances, *Health Bulletin No. 23*, now available in almost all hospitals and dispensaries, should be consulted. Of the cereals, wheat flour is the best; of the pulses, black gram, green gram, red gram (*dāl arhar*) are quite rich in vitamin B₂. Soya bean is also a very good source of vitamin B₂ and proteins, though not available everywhere. Sprouted pulses contain also a certain amount of this vitamin. Amongst the vegetables, potato tops the list in its vitamin-B₂ content, though lady's fingers and tomato also contain some. Luckily, all these three vegetables are fairly abundantly grown in the hills, although not used so much by the inhabitants of this poor district.

Other substances which have been found lacking in the diet of pellagrins, but which are very good sources of proteins and vitamin B₂, are milk, curds, skim-milk powder, ground nut, dates, meat and some fresh fruits and vegetables, though not all.

Medicinal treatment is mostly symptomatic and extremely important too. For its being very rich in vitamin B₂, yeast is universally prescribed; marmite to the extent of an ounce should be added to the patient's diet. It is good for improving the patient's appetite for which we can also prescribe dilute hydrochloric acid and Fowler's solution, as there is hypochlorhydria. Marmite is comparatively cheap and rich in the pellagra-preventing factor of the vitamin-B complex.

Some reliable preparations of liver, e.g., neo-hepatex, having proved of great assistance in strengthening the constitution of pellagrins in my

hands, should invariably be administered to those who can afford it. It curtails the period of treatment, improves the appetite, removes debility, and even relieves stomatitis.

Mention must be made of a new drug tried fairly extensively for pellagrins by American clinicians, namely nicotinic acid. It is stated to be precursor of the PP (pellagra-preventing) factor of the vitamin-B₂ complex. Vitamin B₂ contains three important substances, (1) lactoflavine, (2) vitamin B₆, the rat dermatitis factor, and (3) the PP or pellagra-preventing factor.

I have tried it only on one patient and found it very helpful in improving the local condition of the mouth and the skin. It is a useful adjunct to other parts of the treatment. It cannot, in my opinion, replace the diet regime. A well-balanced diet is indispensable, particularly one rich in proteins and vitamin B₂, but comparatively poor in carbohydrates. No untoward effect was seen even with 210 mgm. a day by mouth and 60 mgm. intravenously. It should be tried on all patients, provided the cost can be reduced a little.

As the patients regard their trouble mainly as local, something ought to be applied locally to the skin and interior of the mouth, e.g., boroglycerine or chromic lotion 1 per cent for stomatitis, astringents for diarrhoea, salicylic ointment four per cent, or some other drug for removing scales from the affected skin of the limbs.

It must never be forgotten that no amount of local treatment will prove of any avail unless the rest of the treatment, especially the dietetic, is strictly carried out.

For improving the appetite and impoverished condition of the blood, ordinary tonics, such as quinine, arsenic, strychnine, and iron should also be prescribed in suitable doses.

Out-patient cases.—Nine cases were treated in the out-patient section of my dispensary. They offered little difficulty in diagnosis which was purely clinical; elaborate laboratory aid is neither available here nor indispensable for diagnosis of pellagra, of which there are many cases even in *tehsil* Hamirpur in the district of Kangra, judging from the fact that almost all the cases seen belonged to this *tehsil*. Nearly all of them were free from nervous manifestations, except a boy about eight years old who had been ailing for three years according to the statement of his parents. He showed evidence of combined postero-lateral degeneration of the cord and could utter only a few words. Mentally he was somewhat dull and peevish in nature. His cutaneous lesions extended up to the middle of his limbs.

All these out-patient pellagrins had modified treatment. It was emphatically impressed upon them that corn bread was bad for them, as it lacked vitamin-B complex which is so very essential for maintaining the integrity of the whole body, particularly of the gastro-intestinal

(Continued at foot of next page)

A MICROSPORUM NEW TO INDIA

By P. A. MAPLESTONE, D.S.O., D.Sc., M.B., B.S., D.T.M.
and

N. C. DEY, M.B., L.T.M. (Cal)

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In India, microsporon infection of the scalp is uncommon amongst children residing in the plains. Practically all the cases we see are European and Anglo-Indian children coming from hill-station schools and as far as we know no case has been reported in an Indian child. Out of 177 cases of ringworm of the scalp clinically and mycologically investigated in the Calcutta School of Tropical Medicine, sixty (51.3 per cent) were caused by microsporon infection. This figure represents only a certain percentage of the cases as all the infected children are not sent down from the hill station schools at the time of an outbreak.

We saw recently several children from Shillong with microsporon infection of the scalp and the material obtained from these cases forms the basis of our present study.

On the 3rd September, 1936, a girl came from Shillong for the treatment of ringworm of the scalp, and on the 2nd and 12th November of the same year two more girls from the same institution attended for the treatment of a similar affection.

On microscopic examination, infected hairs showed evidence of microsporon infection and on culture the same type of growth was obtained from all these cases; but they were different from *Microsporon audouini*, the species usually infecting the scalp.

(Continued from previous page)

tract, and that this deficiency in diet is a common cause of diseases like diarrhoea, vomiting, achylia, anaemia, constipation, colitis, sprue, pellagra, lack of vigour, and impaired growth. The dire need for taking a diet derived from animal food rich in proteins but poor in carbohydrates was pointed out to them. They were very clearly given to understand that they were being underfed and so also their children, whose heights and weights were disproportionate, most of them being under-weight. The names of the articles that they should take and should not take were given to them.

Unfortunately, these patients did not appear for treatment more than twice or thrice each, probably because with general and dietetic treatment their immediate troubles were overcome.

Acknowledgments

My thanks are due to Dr. G. W. Hardy, my civil surgeon, for kind permission to publish this paper. Dr. Mohan Lal Pathak, in charge Jail and Police Hospital, Dharamsala, also deserves my indebtedness for certain really useful suggestions.

During that period four boys from another school in Shillong also attended and were found to be infected with *M. audouini*.

At our request, Major Haythornthwaite, I.M.S., kindly sent specimens of hair from all the cases suffering from ringworm of the scalp in both institutions; and five specimens were received of which three were from the girls' school and two from the boys' school.

Six specimens were studied from each school and microscopically all of them showed evidence of microsporon infection. On culture all the specimens from the girls' school showed growths of the same character; they were different from



Fig. 1.—Photograph showing a single patch on the right parietal eminence.

those from the boys' school which were *M. audouini*.

On the 9th of March, 1937, an Anglo-Indian boy from a school in Calcutta attended for treatment of ringworm infection of the scalp which was found to be similar to those from the Shillong girls' school. When this fungus was isolated an enquiry was made if the boy had visited Shillong and it was found that he was one of a party who went to Shillong for a time and returned to Calcutta in July 1936. He mixed freely with the school children while there.

Clinical characters of the lesions

Out of seven cases of this infection (six from Shillong and one from Calcutta) four attended personally and in the remaining three cases material was received by post. In the four

cases examined the lesions were of the same character. The ages of the patients varied from six to nine years. The size of the patches varied from a tiny spot infecting a few hairs to patches two or three centimetres in diameter. The patches were covered with dry, greyish-white scales, and the infected hairs, which were broken a little above the surface of the skin, could be plucked out easily. These hairs had greyish-white sheaths at their roots, like those infected with *M. audouini*, so there was nothing whereby they could be distinguished clinically.

Microscopic appearance of the hair

Under a cover-slip preparation with a solution of sodium sulphide the size of the spores was



Fig. 2.—Photomicrograph of a hair cleared in sodium sulphide solution ($\times 450$).

found to be from 2.4 to 3μ in diameter. The spores gave a mosaic appearance like that of *M. audouini* (text-figure 2). Mycelial elements were few and they were of the same diameter as the spores.

Cultural characters

Primary cultures: Primary cultures on Sabouraud's test medium.—The culture appears on the sixth or seventh day after inoculation at room temperature (diurnal variation 18°C . to 30°C .) as deep brown or brownish-yellow spots. There is slight surface growth and the submerged growth spreads in the medium in an arborescent and radiating manner. The length of growth varies from 0.5 to 1.25 cm. in six weeks (plate IX, figure 1). It is very slow when compared with that of *M. audouini*.

Primary culture on Sabouraud's conservation medium.—The growth at room temperature appears

on the seventh day after inoculation with the infected hair. It becomes slightly elevated above the surface of the medium and is covered with a thin layer of white, chalky powder except for a narrow ring on the

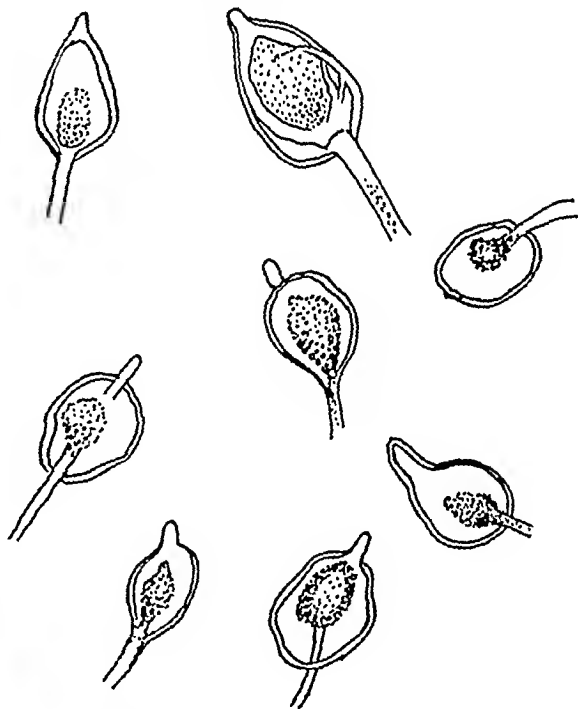
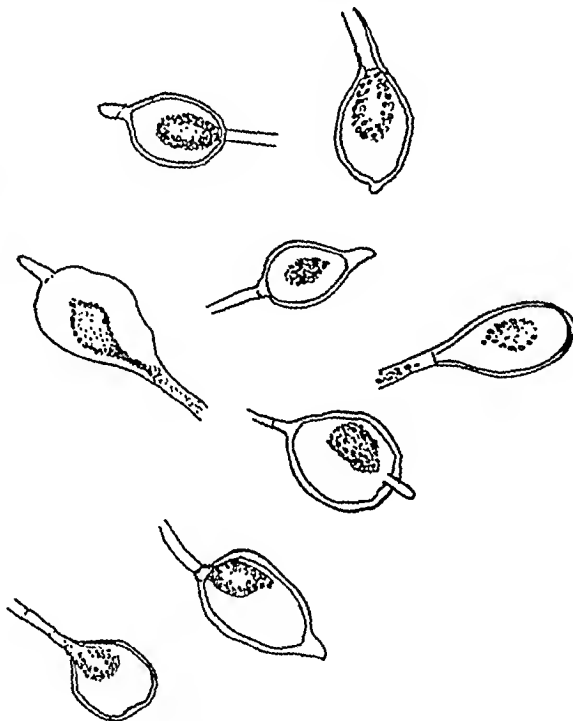


Fig. 3.—Drawings to show terminal chlamydospores in hanging drop cultures ($\times 500$ approx.).
(a) Our fungus.



(b) *Microsporon ferrugineum*.

margin which is smooth and brown in colour. The size of the growth is 0.4 to 0.8 cm. in diameter (plate IX, figure 2).

Subcultures.—Subcultures on most of the laboratory media show two types of growth, namely, a faviform

one (plate IX, figure 4), the surface of which is covered with brownish-white powder or a flat type which is flush with the surface of the medium. When the surface growth is abundant the faviform appearance is well seen in flask culture in Sabouraud's medium, but when the surface growth is small or absent a flat type of growth occurs with lanceolate rays in the medium. An intermediate type is also found in some specimens when there is an elevated surface growth in the centre and a flat growth at the periphery.

On successive subcultures the pigment is gradually lost in some specimens and the growth is also a little more profuse than the primary culture. Results of subcultures on different laboratory media are given in detail below.

The character of the growth on different laboratory media six weeks after inoculation

Sabouraud's test medium with maltose, pH 6.—Either type of growth may occur. Size 1.5 to 2 cm.

Sabouraud's medium with glucose, pH 6.—The first type of growth is often noticed and in some cultures sulphur yellow powder appears at the centre of the growth (plate IX, figure 3).

Sabouraud's conservation medium pH 6.—The character of growth is like that of a primary culture except that there are a few radiating furrows on the surface. Size 1 to 1.25 cm. in diameter.

Glucose agar pH 7.6.—On this medium surface growth is commoner than the flat and transitional forms. The growth is slightly convex and brown in colour. The surface is crossed by multiple, shallow radiating furrows and is covered with fine brownish-white down. In a transitional type the centre is folded or depressed with flat growth at the periphery. Size 3.5 cm. (plate IX, figure 5).

Glycerine agar pH 7.6.—The growth is flush with the surface of the medium and the colour varies from a dark brown to a light brown shade. From the inoculum, lanceolate radiating rays are distributed in the medium. In some cultures the surface shows fine white velvety down. Size 2.5 to 3 cm.

Nutrient agar pH 7.6.—The growth is like that on glycerine agar except that it is lighter in colour and the rate of growth is slower.

Blood agar.—The flat type of growth occurs in this medium. There is a narrow margin of hemolysis round the growth. Size 2 cm.

Inspissated serum.—The growth is smooth and becomes slightly wrinkled with age. Size 1.5 to 2 cm. It is slightly proteolytic.

Dorset's egg medium.—The character and rate of growth is like that on inspissated serum but there is fine velvety down on the surface.

Potato medium.—The growth in this medium is slightly convex and the centre is slightly mammillated. The colour is brown and the margin often has a deep brown or chocolate shade. Size 1.5 to 1.5 cm. (plate IX, figure 6).

*Bacsa medium pH 6.**—The surface growth is often profuse, and flat growth is rarely seen. In a culture where the surface growth is profuse the centre is elevated above the surface of the medium and is covered with brown or sulphur-yellow powder. It is traversed by a few shallow radiating furrows. Round the central elevated portion there is a flat submerged growth. The central growth is about 1.25 cm. in diameter and the whole varies from 3 to 3.5 cm. (plate IX, figure 7).

Synthetic medium (Czappek's solution with agar) pH 6.—There is only slight submerged growth and the size varies from 0.75 to 1 cm.

Natural media.—Culture on wheat, barley, paddy, rice, etc., gives no appreciable growth.

Action on sugar.—No change has been observed in ordinary laboratory sugars; glucose, maltose, mannite, dulcitol, saccharose, salicin.

Action on milk.—No proteolytic change has been noticed in milk.

Anaerobic culture: On Sabouraud's test medium.—The growth is elevated above the surface of the medium and the surface is covered by a dense uniform layer of dirty white powder and is marked by multiple radiating furrows. The deep surface shows a deep brown or a light chocolate shade. Size 0.75 to 1.25 cm.

Complete anaerobiosis.—Under completely anaerobic condition in MacIntosh and Fildes's jar, no growth has been observed during a period of three weeks.

Mycology

The separate mycelia are 2 to 3.2 μ in diameter with dichotomous branching. Sessile aleurospores are very occasionally seen. Atypical mycelial racquets are often present. Intercalary chlamydospores are generally isolated but are found in short chains occasionally. Terminal chlamydospores may be found, oval or spindle-shaped and vary from 20 to 30 μ or rarely up to 35 μ in length. Formation of septa in the terminal chlamydospores has not been noticed. Pectinate hyphae are rare.

Pleomorphism.—No pleomorphism has been noticed when subcultures are carried on at intervals of two months.

Animal inoculation.—Cultures from the seven original cases were all used in these experiments and they were all negative on guinea-pigs, mice, rats, rabbits and monkeys. Controls on guinea-pigs with *M. ferrugineum* and *M. andouini* were also negative.

Spread of infection.—The infection appeared to have spread amongst the inmates of the boarding school through direct contact, as we could not find any animal likely to act as a carrier.

Discussion

All the cases so far studied were similar and showed clinical evidence of microsporon infection of the scalp. Microscopically the hair showed small spores with typical mosaic distribution similar to that of *M. audouini*. The cultural characters resembled those of *M. ferrugineum* Ota, 1921. The primary culture showed a colour resembling that of *M. ferrugineum* but the typical deep yellow colour, characteristic of *M. ferrugineum*, was absent in our subcultures, moreover our cultures were not glabrous as they are in *M. ferrugineum*. On the contrary cultures of *M. ferrugineum* may give a brown or chocolate colour as obtained in our cultures. On potato and Bacsa media the growths of *M. ferrugineum* and our fungus were very much alike and on Sabouraud's glucose agar a sulphur-yellow colour appeared.

Regarding the morphology we made a detailed study of our fungus in comparison with *M. ferrugineum*, and no differences were discernible.

Inoculations on laboratory animals were negative.

EXPLANATION OF PLATE IX.

Cultures of our fungus—6 weeks old.

Primary culture on—

Fig. 1.—Sabouraud's test medium.

Fig. 2.—Sabouraud's conservation medium.

Subculture on—

Fig. 3.—Sabouraud's glucose agar.

Fig. 4.—Sabouraud's test medium (flask culture).

Fig. 5.—Glucose agar.

Fig. 6.—Potato medium.

Fig. 7.—Bacsa medium.

* Glucose.	Peptone aa	10 grms.
Maltose.	Agar	20 grms.
Dextrin.	Water	1,000 c.cm.



Fig. 1.

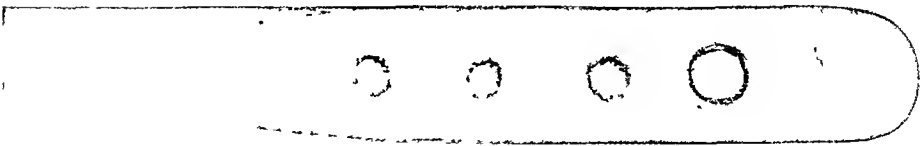


Fig. 2.

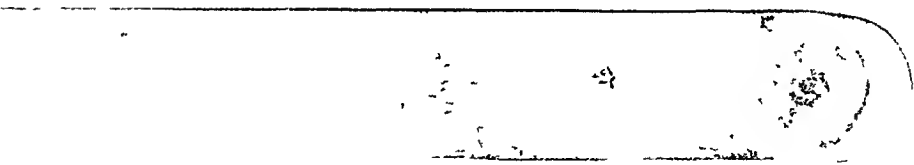


Fig. 3

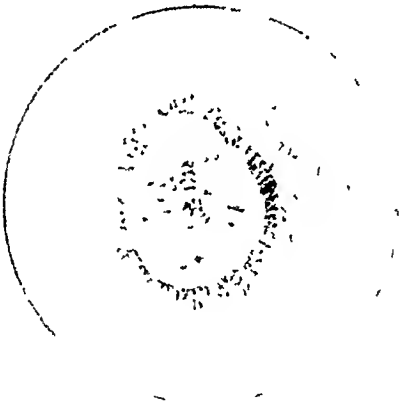


Fig. 4.

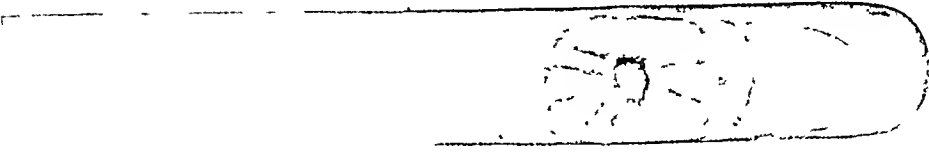


Fig. 5.



Fig. 6.



Fig. 7.

In view of the above facts it appears that this microsporon is possibly a variant of *M. ferrugineum*.

Summary

1. Seven cases of microsporon infection of the scalp caused by a fungus hitherto unknown in India have been recorded. The clinical, microscopical and cultural characters have been noted.

2. Culturally it grows slowly and shows chiefly two types of growth—a raised faviform type and a flat type.

3. The type of growth resembles that of *M. ferrugineum*.

4. The colour of our cultures was various shades of brown whereas brown has only occasionally been recorded in *M. ferrugineum* in which deep yellow is the most usual.

5. The morphology is similar to that of *M. ferrugineum*.

6. This fungus is possibly a variant of *M. ferrugineum*.

Acknowledgment

We acknowledge the receipt of cultures of *Microsporon ferrugineum* kindly supplied to us by Professor Ota of the Faculty of Medicine of the Imperial University of Tohoku, for comparison with our species.

Treatment

Out of seven cases recorded three were treated by us. The first case had multiple patches on the scalp and was treated with x-rays. An epilation dose was administered after the technique of Adamson. Twenty-one days after the exposure, while there was a partial epilation, a patch two inches in diameter was noticed behind the left ear and was treated with the following preparation applied twice daily :—

Thymol	gr. x
Oil of cinnamon	ms. x
Liquor iodi mitis	oz. i

Along with this application manual epilation was done and the patient was discharged cured in about three weeks.

The second case showed a few tiny spots and was treated with the application of the same paint along with manual epilation. He was discharged cured in a month.

The third case had a single patch on the right parietal eminence about two inches in diameter and was treated for three months with the above paint. As the patient was improving satisfactorily she left Calcutta with a supply of the paint and necessary instructions. About three months later she came back with multiple patches on the scalp. The same paint was continued for two months along with manual epilation. Her hair was clipped short to find if there were any newly infected patches. As the progress was slow 2 drachms of glacial acetic acid was added in an ounce of the above prescription. The patient was discharged cured, after using this new application for three months.

OBSERVATION ON THE PATHOLOGY AND THERAPY OF THE SO-CALLED FRONTIER SORE

By H. J. HAMBURGER, M.D. (Hamburg)
Gordon College, Rawalpindi

Introduction.—In his report on 'A limited outbreak of diphtheria exhibiting both cutaneous and faucial lesions', Bensted (1936) says that the patients under observation sustained some sort of abrasion in climbing up or scrambling down the steep rock-strewn *khud*-side. The wounds appeared to be trivial, but did not heal. That this non-healing did not attract attention earlier may be explained by the fact that a condition very similar in appearance is very common in this area (North-West Frontier Province). It develops from a simple abrasion and is often very slow to heal. The aetiological agent in the majority of cases appears to be a staphylococcus, but it is probable that several factors are responsible for the slow healing. The lesion is often referred to colloquially as Frontier sore, but is not to be confused with the Leishmania infection that on occasions has been known by that name.

Subject of this research.—As Bensted indicates, it is very difficult, if not impossible, to make clinically a difference between a chronic sore with or without diphtheria. It seems equally difficult, as the history given is usually not reliable, to differentiate between this clinical complex of chronic sores and the real Leishmania infection, once the oriental sore is broken down. The great number of cases with these chronic ulcerations of the skin give the impression of a low virulence of the infecting agent. Nevertheless they are resistant to routine treatment. That induced us to collect data as to the pathology and therapy of the condition.

We carried out investigations to find what part the various micro-organisms take in the aetiology of the chronic minor septic conditions of the skin, occurring in this area. We tried to define any further aetiological factors, and finally we controlled the results of various treatments, selected with a view to being as specific as possible. The results of the laboratory work we worked on the following hypothesis : The Frontier sore is to be regarded as a clinical entity. It can be divided into several aetiological groups, each of which requires a treatment of its own.

Method.—From December 1937 to October 1938 we collected 88 cases from Rawalpindi, Tonk in south Waziristan, Taxila and Sialkot, that is from places under similar climatic and geographical conditions in the north-west Punjab and North-West Frontier Province.

Each case was examined first for Leishman-Donovan bodies. An intramuscular needle, applied to a record syringe, was inserted from outside towards the ulcer, until the point of the needle almost reached the margin of the ulcer.

A few droplets of serum or tissue fluid without blood were withdrawn. Those were placed upon a slide, made into a film and stained in the usual way after Giemsa or Leishman. Repeated examination in cases in which leishmania had been found showed us that the parasites will be unfailingly revealed by this method.

The next step was the bacteriological examination. Normal saline was applied for 24 hours

On the whole, the condition cannot be considered as presenting a very typical or striking clinical aspect. In the selection of our cases we have been guided more by the chronicity and obstinacy to treatment than by the clinical appearance. The number of cases collected from the various places and the micro-organisms recovered from the sores are shown in the first table :—

TABLE

Place	Number of cases	With leishmania	With KLB	With <i>Staph. aureus</i>	With <i>Staph. albus</i>	Streptococci	Others and sterile
Rawalpindi ..	47	6	3 *	21	10	2	..
Tonk (South Waziristan)	19	0	0	6	8	3	..
Taxila ..	8	2	0	4	1	0	..
Sialkot ..	14	1	0	0	3	0	..
	SS	9	3	31	22	5	13

* Two proved virulent.

Not examined, 5.

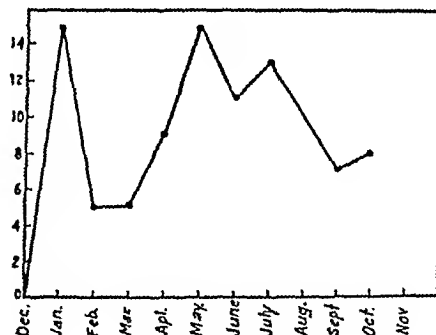
and with a swab material taken from the surface of the ulcer. Incubation was made as a rule on Löeffler's medium, sometimes on Löeffler slopes as well as on blood-agar plates. Subcultures and biological assays were made as required by the bacteriological methods. The examination for leishmania was carried out in each case, the bacteriological examination in the majority of the cases.

Inquiries as to the history of the case were made. Location, size, and clinical appearance of the sores were noted, a physical examination of the patient undertaken and his diet investigated. These data were put onto a printed form on which space was provided for follow-up observation. This form was filed with the clinic or hospital that attended to the patient and collected after the patient's discharge. A corresponding chart with the microscopical proceedings was kept at the laboratory. That is the material underlying this study.

Results.—This is the clinical aspect of the affection under observation: the sores may be single or multiple. There is a certain predilection as to location in so far that the trunk is less frequently affected, while the palms and soles were not found affected. The discharges frequently form brown crusts, under which a shallow ulcer lies with sharply-cut vertical edges. Frequently this ulcer forms the top of an indurated and elevated area. Sometimes the ulcer is found clearly cut into the healthy skin. The surroundings of the ulcer show, especially in the cases with induration and elevation, a pale pink or bluish cyanosis. Frequently, in the older cases, an atrophy of the epidermis is noticed, giving it the appearance of cigarette paper. Sometimes these atrophic parts are covered with fine, white scales. The size of the ulcers varies from $\frac{1}{2}$ to $2\frac{1}{2}$ inches.

We have found that the aetiology of the Frontier sore cannot be described by mentioning one single germ or parasite. The Leishman-Donovan body, the traditionally accused agent, totals only about 11 per cent.

The seasonal distribution of the cases, as they were admitted for treatment, is shown in the



graph. The apparent increase in the number in the late autumn and late spring corresponds with the empirically gained opinion of medical men in this area. It should however be considered as open to certain doubts, as some cases do not come under observation until many months after the beginning of the affection.

The duration of the condition prior to admission under our control was found to vary from 5 years to 14 days. Only sores which had not shown a tendency to heal after at least 2 weeks of routine treatment were considered suitable for this investigation. The average duration, however, was about $2\frac{1}{2}$ months.

There was reason to suspect that some nutritional deficiency might be one of the causative factors of this chronic condition. Careful inquiry in each single case as to the diet revealed the fact that only in 6 cases was a diet offering little variety taken which could be called deficient in its vitamin-C content. No evidence for

caloric underbalance or lack of other vitamins or minerals could be found. It was rather noticeable that the condition occurs in people clinically otherwise completely healthy.

Two cases in which staphylococci had been found were treated with vitamin C, orally and by injection, but the sores did not respond to this treatment. One case had a diet with insufficient vitamin-C content, the other had a normal diet.

In several cases, a microscopical examination for a fungus was undertaken, in order to pursue the etiological research in as many directions as possible. In only one case was a fungus found. This, after histological examination, proved to be an initial actinomyces of the skin. Where it appeared necessary from any point of view, an examination for tubercle bacilli and the Wassermann reaction was undertaken. Cases in these categories are not considered here. We regret that no facility was available to examine the sores as to a possible virus as an agent. From the results compiled it seems still possible that a virus may be the primary agent in the cases which are not due to leishmaniasis. Research into this question will be carried out as soon as the necessary facilities are available.

It has been found that the history does not often help much in the diagnosis. Only about one half of all the patients were able to give us any information as to the very first symptoms. In 10 cases mosquito or other insect bites were made responsible; none of these cases showed leishmania. If there was a definite history of a trauma, leishmaniasis can be regarded as being ruled out. Oriental sore, *sensu strictiori*, can be recognized when in the stage of the initial papule, but once broken down, the microscopic examination is the only sure help in the differentiation. Even that will fail in very old-standing or previously-treated cases.

Treatment.—We desired that in the treatment of the collected cases those methods should be employed which were the most specific ones regarding the nature of the micro-organisms revealed in the sores.

1. This was easiest in the cases of eutaneous diphtheria. One case healed rapidly with intramuscular injection of antitoxin (20,000 units) and dressing with the antitoxin, within 7 days. Another case took one month before it healed. Conclusions as to the effectiveness of the treatment cannot be drawn from our three cases.

The necessary subcultures, to obtain a definite bacteriological diagnosis, were carried out, and in two cases virulence tests which guinea-pigs were undertaken which were positive.

2. Out of the 9 cases of oriental sore, 7 could be followed up as to the result of the antimony treatment. Five cases had treatment with Fouadin; four healed after 10, 10, 7, 5 injections, respectively. The injections were given daily or on alternate days. The initial dose was 0.5 c.cm., thereafter the regular dose was 1.0 c.cm. for each kilogramme of body weight. One

case after 6 injections showed no signs of improvement. Two cases were treated with neostibosan; one showed only slight improvement after 10 injections of 0.3 gm. of this pentavalent antimony compound. The initial dose was 0.2 gm.; one injection of 0.45 gm. was given, but not tolerated.

It would be well worth while to decide in a longer series of oriental sores, if the pentavalent or the trivalent compound is more effective. Fouadin, the antimony-pyrocatechin disulphonate of sodium, has acted well. It seems desirable indeed to put it to further clinical trial.

3. The great number of cases remaining after leishmania and KLB cases had been ruled out offered a difficult therapeutical problem. We observed before the beginning of the therapeutical studies dealt with in this communication, 21 cases under various treatments. Copper sulphate and lactic acid, ichthyol, various other antiseptic and stimulant local applications produce sometimes favourable, sometimes no results at all. In 50 per cent of the cases of this series the ulcers were not healed after three weeks. General treatment was employed, such as vitamin C, given as mentioned above. Antimony preparations were applied, regardless of whether leishmania were present or not. It seems impossible to compare all the previous treatments in view of the results obtained in the cases studied in this report. This first series showed us that the state of the treatment of the condition under discussion was unsatisfactory. In 50 per cent there was no visible result within 2 months of treatment; the rest needed in a few cases one week, but the average was 3 to 4 weeks for recovery.

We decided to make an experiment with a local application of the new bactericidal substances of the sulphonamide group. Our observation has shown us that their antiseptic power fortunately is combined with a stimulating power which produces granulations and epithelial growth.

We are well aware of the possibility of pharmacological and toxicological differences in the action of the various chemicals containing sulphonamide groups (para-amino-benzene-sulphonamide). There seems now to be evidence available showing that the affinity of the many sulphonamide-containing substances to certain tissues is not always the same. Our experiments, however, are not extensive enough to contribute new information about these difficult questions. We agree with Cokkinis (1938) who says 'So much has been written upon the subject of the "new chemotherapy" and it is still impossible to dogmatize about it'. We shall therefore report our observations without joining in the discussion of unsolved problems of the chemotherapeutical research.

Messrs. Bayer have kindly produced upon our request a 5 per cent ointment with a prontosil base (4-sulphonamide-2', 4'-diamino-azobenzol). As there is very little literature available here

we are not in a position to give references in regard to prontosil in local application or in an ointment. Lately, upon our quest for a sulphonamide preparation convenient for local application, Messrs. May & Baker have supplied us with some samples of their 6 per cent soluseptasine ointment (disodium-phenyl-propyl-amino-benzene-sulphonamido-dilusphonate). I find the literature does not contain any reports about work with this ointment. The manufacturers, however, received some communications regarding the efficacy of this preparation in case of streptococcal infections of the skin*.

We have been able to examine and follow up the effect of local application of prontosil rubrum (diaminoazo-benzol-sulphonamide), prontosil soluble (disodium-acetyl-amino-oxynaphthalene-disulphonate) and soluseptasine (disodium-phenylpropylamino-benzene-sulphonamido-disulphonate) in 45 cases of Frontier sore with non-specific bacterial flora. In the table are given: the type of germ found, the duration of the disease before administration of sulphonamide was started, the period after which complete healing was reached, i.e., restoration of the subcutaneous tissue and epithelium. Furthermore the number of applications and the form in which the individual drug was given are indicated. The average duration of the affection before the described treatment was given was 2½ months. One case of 5 years' duration was not taken into account. Healing occurred in 40 cases out of 45. The average time needed for treatment was 7.5 days. The average number of applications was 4.25.

* After I had sent the paper to the press, the following publication regarding prontosil in local application came to hand:—

K. H. Jaeger (1936) reports that in infective diseases of the skin, for instance whitlows and furuncles, a few prontosil dressings diminish the secretion and promote granulation formation. Prontosil was especially effective in abscesses of the sweat glands which had previously been treated for months without results. This I can confirm from my own observation.

Jaeger further saw favourable results from prontosil when applied to dirty sport and street wounds. The same observation was made by Sigel (1936).

Jaeger used prontosil in local application also for certain forms of eczema. He painted the affected areas with a saturated solution from the tablets with equal parts of alcohol and acetone. Weeping dermatitis responded better to prontosil ointment, 2 to 5 per cent prepared with lanoline and liquid paraffin.

Merz (1937) used a 10 per cent ointment which improved rapidly acne, furunculosis and impetigo contagiosa.

J. F. P. Gallagher (1938) obtained successful results in the treatment of erysipelas and acute dermatitis by using as a local application prontosil red, 7½ grains being dissolved in 1 ounce of distilled water. He says that the value of this preparation in local application should not be overlooked.

ADDITIONAL REFERENCES

- Gallagher, J. F. P. (1938). *Brit. Med. J.*, i, p. 104.
 Jaeger, K. H. (1936). *Deut. med. Woch.*, Vol. LXII, p. 1831.
 Merz, H. (1937). *Schweiz. med. Woch.*, Vol. LXVII, p. 342.
 Sigel (1936). *Fortschr. Therap.*, No. 4, p. 229.

Report of a few outstanding cases:—

Case 1.—Baker, aged 24 years, male. Ill for one year with a sore at the ulnar side of the right wrist. No accident or insect bite. A small area of irritation upon which a vesicle formed.

General examination does not reveal anything pathological. Mixed varied diet, with fresh fruit and vegetable, milk and meat beside the staple foods.

1½ × 1½ inches big ulcer, slightly secreting. Punched-out in an indurated area, slight atrophy of the surrounding skin. *Staphylococcus aureus*.

Three days of dressing with 1 per cent aqueous solution of prontosil soluble, the ulcer healed. Fourteen days later the newly-formed thin epithelium is strong and healthy.

Case 2.—Signalman, aged 30 years, male. Ill for one year with multiple ulcers on the back of the left foot. Started spontaneously with little boil.

General examination and diet as case 1.

Ten small ulcers in a 3 × 3 inches atrophic area over hand, indolent swelling extending over the back of the foot. The whole foot and the ankle show considerable œdema. *Staphylococcus aureus*.

After 14 days' locally applied prontosil base and 1 tablet daily twice for 8 days, the subcutaneous swelling has gone, the small defect has healed.

Case 3.—College student, aged 17 years, male. Ill for five years. Beginning with small boil.

General examination and diet as case 1.

Single 1½ × 1½ inches sore on right forearm, extensor aspect. Flat, dry punched-out ulcer, with very little underlying induration. Small areola of pink cyanosis. *Staphylococcus aureus*.

After one day's application of prontosil base ointment the old scab is removed, fresh granulations are appearing in the ulcer ground. After seven days epithelialized.

Any ill effects in general from the local application of sulphonamide-containing compounds have not been observed. There was never any local deterioration or irritation noticed. We have, as an experiment, rubbed in, for 15 minutes, all three preparations used. Afterwards, over a period of several days, we applied at the same place on the flexor aspect of the forearm the solution or ointment, respectively. No irritation or other disturbances occurred.

We propose to investigate *in vivo* the action of sulphonamide compounds upon various germs in experimental infections of the skin. *Staphylococci* do not belong to those bacteria known to be very susceptible to the new compounds. It would be interesting to find out if, in the environment of the skin, the susceptibility is changed, as compared with the blood. It will later be necessary to collect data as to the best vehicle for the chemicals and the most effective concentration. We intend and have started already to collect material about the influence of these preparations in acute infections of the skin.

Summary

1. The so-called Frontier sore is a clinical entity. Only laboratory examination reveals various ætiological groups, with leishmania, Klebbs-Löffler bacilli and a large group with non-specific common pyogenic organisms, mainly *Staphylococcus aureus*.

2. The exact microscopic diagnosis permits specific treatment for each case according to

the organism revealed. For the big group of sores with common pyogenic and contaminating organisms, compounds containing sulphonamide prove to be of efficacy in local application.

patients, to Dr. R. C. Hunsberger from the Memorial Hospital, Sialkot, and Dr. J. Samuel from Taxila Hospital for the permission for making observations on their patients.

TABLE

Number	Germ	Duration before beginning of treatment, days	Healed after, days	Number of applications	Preparation used
1	<i>Staph. aureus</i>	45	9	8	Prontosil solution, 1 per cent.
2	"	41	5	2	" 1 "
3	"	17	18	10	" 1 "
4	"	210	21	10	" 1 "
5	"	17	10	10	" 1 "
6	<i>B. subtilis</i> and <i>Staph. aureus</i>	14	16	8	" 1 "
7	<i>Staph. aureus</i>	15	2	2	" 5 "
8	"	15	6	4	" 5 "
9	"	365	3	3	" 1 "
10	"	365	13	12	" 1 "
11	"	60	12	5	Soluseptasine.
12	"	180	10	2	Prontosil solution, 1 per cent.
13	<i>Staph. aureus</i>	15	10	4	" 1 "
14	<i>Strept. beta</i>	105	14	2	" 1 "
15	<i>Staph. aureus</i>	90	No benefit	..	" 1 "
16	" <i>albus</i>	..	12	5	" 1 "
17	" ?	75	10	6	" 1 "
18	<i>Staph. aureus</i>	45	No benefit *	..	" 1 "
19	" <i>albus</i>	30	10	5	Prontosil " base ointment, 5 per cent.
20	" <i>aureus</i>	..	10	8	" 5 "
21	" ?	5 x 365	7	5	" 5 "
22	"	16	14	12	" 5 "
23	<i>Staph. aureus</i> and others.	16	No benefit	..	" 5 "
24	"	15	3	3	Soluseptasine ointment, 6 per cent.
25	"	30	8	8	Prontosil solution, 1 per cent.
26	<i>B. subtilis</i>	14	2	2	Prontosil ointment, 5 per cent.
27	<i>Staph. aureus</i>	..	7	4	" 5 "
28	"	15	7	3	" 5 "
29	"	..	No benefit	..	" 5 "
30	<i>Staph. albus</i>	75	9	6	" 5 "
31	"	25	6	4	" 5 "
32	"	15	8	..	" 5 "
33	" ?	20	8	4	" 5 "
34	<i>Staph. albus</i>	30	6	..	" 5 "
35	"	365	6	4	" 5 "
36	"	60	6	3	" 5 "
37	"	60	7	7	Soluseptasine, 6 per cent.
38	"	19	7	2	" 6 "
39	"	16	3	8	" 6 "
40	"	..	10	5	" 6 "
41	"	..	7	3	" 6 "
42	"	210	7	5	" 6 "
43	<i>Staph. aureus</i>	210	7	2	" 6 "
44	"	17	3	..	" 6 "
45	"	60	14	..	Prontosil, 5 per cent.

* Healing prevented by scratching.

Acknowledgments

We are indebted to Lieut.-Colonel T. O. Thompson, R.A.M.C., for the help in finding accommodation for the bacteriological examination; to Colonel F. F. Strother-Smith, I.M.S., for providing cases at the I. M. H., Rawalpindi, to Major F. J. Hallinan, R.A.M.C., for kind help and interest in the work at the District Laboratory; to Captain R. B. Davis, I.M.S., for the faithful collection of cases and clinical data of many

We are obliged to Dr. O. Urchs for furnishing us with samples of the Bayer preparations mentioned here, especially for providing the new Prontosil base ointment. Messrs. May & Baker for have given us their help in sending samples of their Soluseptasine ointment.

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SUPRAPUBIC LITHOTOMY

By F. R. W. K. ALLEN, M.A., D.M.,
M.A.O. (Dublin Univ.), M.C.O.G.
Civil Surgeon, Nagpur

THE method here described contains no original features but in it are combined several suggestions which have been collected from the publications of surgeons of repute. It thus appears to be superior to the operation as usually described in textbooks. In my hands it has given excellent results.

The patient is prepared in the usual manner. The largest firm rubber catheter which will pass through his or her urethra is taken and prepared as follows (figure 1). A stout sewing needle (F) is threaded with braided silk or strong linen thread (A). The needle is driven into the catheter about one inch from its base (B). The needle is then passed up the lumen of the catheter to about two and a half inches from the apex, where it is made to perforate (C) the wall and is then drawn through to the outside. Finally, the needle is driven through the tip of the apex of the catheter (D). The thread is then detached from the needle and knotted so that it cannot be withdrawn from the catheter. It is advisable to cut a couple of extra eyes (E and E, figure 2) in the catheter, which with the thread is then sterilized by boiling.

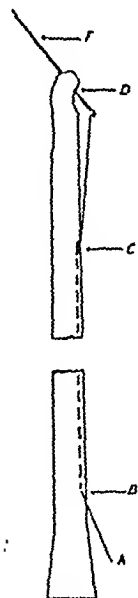


Fig. 1

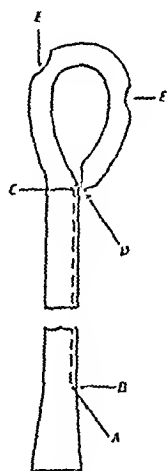


Fig. 2

The patient having been placed on the table and anesthetized, the catheter is passed into the bladder, and the thread is drawn taut (figure 2). Where it emerges from the base of the catheter (A) the thread is knotted round a match, thus converting the catheter into a self-retaining one.

The bladder is now washed out with an antiseptic solution and left empty except for the stone and the loop of the catheter. A transverse suprapubic incision is made through the skin and subcutaneous tissues down to the recti muscles. The recti (figure 3) are separated and retracted

laterally. Air is then pumped into the bladder until it bulges into the wound. The peritoneum is wiped upwards until the bladder muscle is exposed. Two tension sutures are inserted into the bladder to act as retractors and the bladder

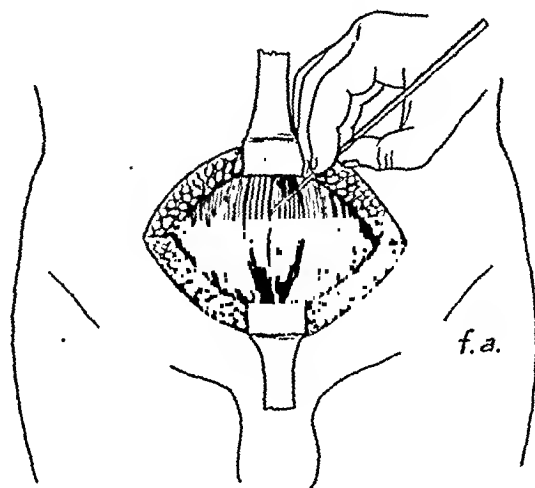


Fig. 3

is incised transversely (figure 4). The stone is removed and the bladder incision closed by two layers of continuous catgut. The recti are allowed to fall together. A thin strip of old rubber glove is left, as a drain, from the exterior of the bladder to the surface for one day only. The skin wound is closed by clips or by sutures. The patient is kept on a mixture of ammonium

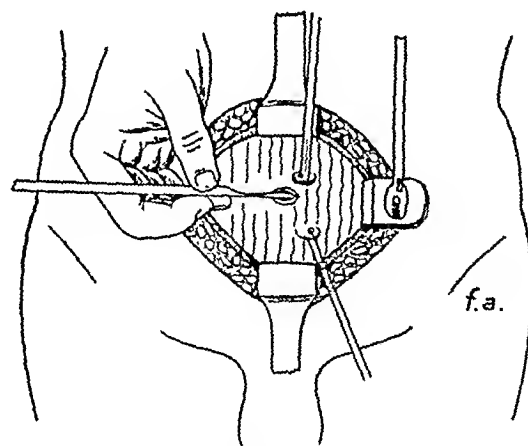


Fig. 4

chloride and boric acid, sufficient being given to prevent the urine becoming alkaline, until the self-retaining catheter is removed on the fifth day. This is effected by cutting the thread where it is tied to the match.

Comments

1. Transverse skin and bladder incisions heal more satisfactorily and are less uncomfortable to the patient than vertical incisions.

2. Distending the bladder with air before incising it is much less messy than distending it with fluid.

3. The type of self-retaining catheter described cannot come out by accident.

A Mirror of Hospital Practice

URTICARIA FOLLOWING PRONTOSIL RUBRUM TABLETS

By R. L. SONI, M.B., B.S., F.R.C.S.
The Soni Clinic, Paungde, Burma

R., an Indian male, aged 31, suffered from successive crops of acute indurations of the skin. The swellings varied in size from an almond to a walnut, and had the following course: A tiny green pustule would appear at the top of an acute induration and the pus was found to contain staphylococci. Bursting of the pustule was followed by spread of œdema beyond the induration, at times the œdema being quite extensive extending from the elbow to the dorsum of the hand in a pustule on the middle of the forearm and over the greater part of the lumbar region in a pustule on the back. Local application of tincture of iodine and fomentations together with rest and evacuation of bowels with enemata relieved the condition, the œdema fading away first and then the induration. After expression of the contents of the pustules an itchy but healthy looking skin with a pigmented dot at the site of the original pustule was left, the whole process taking six to ten days. While one 'pustule' was healing, another appeared at another site, thus giving three to seven 'pustules' in various stages at one time. The patient was otherwise healthy. He had had streptococcal sore throat six months earlier which was treated successfully with prontosil album tablets.

Despite various local and general treatments, the trouble had continued for over two months. Prontosil rubrum tablets, one tablet three times a day, was prescribed. On the night following the second day of administration drenching sweats occurred and the next day the man felt very ill. In the evening mental confusion and a burning sensation in the whole body were complained of, but on examination, apart from the usual red urine and temperature 99.2°F., nothing abnormal was detected. Towards midnight he felt severe itching all over the body and could not help scratching at his skin and even pulling at his hair. His face was puffy and the skin was covered with an urticarial eruption. Oral temperature at the time was 100.2°F. Colloidal calcium and adrenalin were injected. Next day prontosil was stopped, an enema administered, and colonic lavage done and 'dimol' and 'calcionates' prescribed for oral use. The urticaria cleared by evening but itchiness persisted till next day.

On the sixth morning prontosil was again started but the following midnight urticaria recurred so it was considered to be the causative factor and was given up. Thereafter the case was successfully treated with stannous-manganese, vaccines and adexolin.

A month later when the patient was quite recovered, two tablets of prontosil rubrum were again given to test his sensitiveness to the drug and that night at 2 a.m. urticaria again distressed him though to a lesser extent than previously, but four days later when prontosil album tablets were tried nothing untoward happened.

Comments.—That there existed a direct relationship between the administration of prontosil rubrum tablets and the appearance of urticaria is quite obvious in this case from the observations that urticaria developed only following the ingestion of the drug, subsided with its stoppage and that no urticaria appeared in the intervals. I have seen three more cases where urticaria complicated the clinical picture in prontosil therapy—one in a case of erysipelas where prontosil album was given orally

and the red solution intramuscularly, another in a case of septic sore throat where only prontosil album was used orally and the third when it was used intramuscularly after abortion. But in those three cases urticaria appeared when the drug was given for a week or more. In the present instance the urticaria appeared early and, although the patient was found definitely sensitive to prontosil rubrum tablets, no sensitiveness was exhibited to the ingestion of prontosil album tablets, neither some months earlier when he was treated for streptococcal sore throat nor later when he was given a trial dose of the drug. Dietetic factors appear to be excluded, for were they operative they would act with both album and rubrum tablets of prontosil.

Summary.—A case is described where urticaria followed the oral administration of prontosil rubrum tablets though no sensitiveness was exhibited to ingestion of prontosil album tablets.

ARTHROPLASTY OF THE FIRST INTER-PHALANGEAL JOINT OF THE MIDDLE FINGER

By M. G. KINI, M.C., M.B., M.Ch. (Ortho.), F.R.C.S.ED.
Surgeon, King George Hospital, Vizagapatam
(S. India)

SPEAKING generally, the treatment of fractures in country districts is very unsatisfactory in South India. Out of 165 fractures of the metacarpals and phalanges seen from 1930-37, 85 per cent were treated as sprains and contusions in *mofussil* hospitals and by bone-setters. The result of such treatment was very marked functional disability. Any injury which occurs at the metacarpo-phalangeal or inter-phalangeal joints has to be treated with particular attention to restoration of normal alignment of fragments if normal function is to be restored. Skin or skeletal traction must be employed in cases where normal alignment cannot be easily restored. Suitable splints have to be made in order to obtain traction. When injuries to the head of the metacarpals or the base or head of the phalanges are treated as sprains the result will be stiff fingers with loss of movement and function. The stiffness of the fingers in these cases is due to mal-union. To restore the function of such fingers arthroplasty, advocated by Bunnell and McAusland, is the operation of choice. One such case was treated by arthroplasty with the results shown in the accompanying illustrations.

A male student, aged 16 years, was admitted in 1936 for stiffness and inability to flex the middle finger at the proximal inter-phalangeal joint. He gave a history of twisting of the middle finger in a domestic quarrel. This resulted in swelling, pain, tenderness and loss of function of the middle finger. He was treated in a district headquarters hospital for a sprain and later by a bone-setter with forced movements, the final result being increased stiffness.

On examination, a spindle-shaped swelling, most marked on the volar and medial aspects of the first inter-phalangeal joint of the middle finger, was found. The distal part of the middle finger was slightly

deviated towards the ulnar side. The left middle finger was shorter than the one on the right side. No movements were possible at the inter-phalangeal joint and the finger was fixed in extension. X-ray showed a stove fracture of the head of the proximal phalanx which had united in a bad position.

Treatment.—Under ethyl-chloride-ether anaesthesia, the ends of the bones were exposed by a dorso-lateral incision and excised subperiosteally after lifting the attachment of the flexor sublimis digitorum and interossei from the second phalanx. The head of the



Fig. 1.

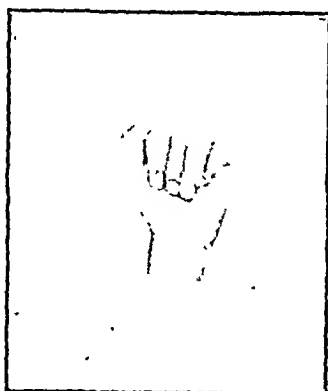


Fig. 2.

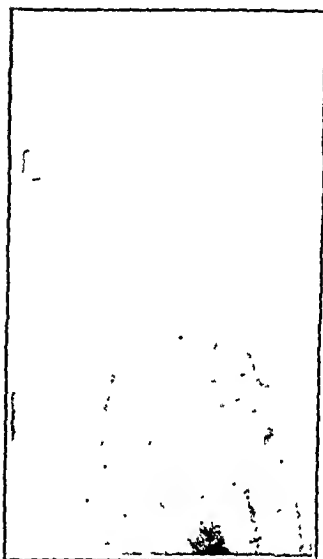


Fig. 3.

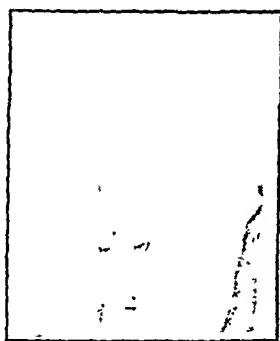


Fig. 4.

Fig. 1.—The clinical result after arthroplasty of the first inter-phalangeal joint of the left middle finger. Note the extension of the finger.

Fig. 2 illustrates the flexion after arthroplasty.

Fig. 3.—Lateral view of the first inter-phalangeal joint showing a stove fracture of the head of the first phalanx with mal-union.

Fig. 4.—The condition after arthroplasty two years after operation. Note the concave upper end of the first phalanx and convex surface of the second phalanx at its base.

proximal phalanx was made concave and the base of the distal phalanx was made convex and the two ends were covered by fascia lata from the thigh. The wound was sutured in layers. Skeletal traction was obtained by a Kirschner's wire inserted through the distal phalanx with a special clamp made for the finger extension. A special extension splint was made by incorporating a loop of stout wire in plaster of Paris applied to the forearm.

The sutures were removed on the 10th day. On the 14th day the extension was removed and the finger was gradually flexed actively and maintained in that position until complete flexion was obtained, which

took five days. Afterwards active flexion and extension was encouraged with massage for a fortnight, at the end of which period the man went home with advice to carry on the treatment.

He reported in 1938 with the functional result shown by the pictures and the x-rays. Though the finger is definitely shorter and ugly to look at, the student has a very firm and good grip and active flexion and extension are very satisfactory.

Points of interest

Arthroplasty of the first inter-phalangeal joint is a difficult problem, because of the fact that active flexion and extension at this joint are entirely done by the flexor sublimis digitorum and the interossei, respectively. While doing arthroplasty this attachment should be carefully preserved and if it has to be detached it must be reinserted at a distal level by transplantation technique. In this case it was not necessary to do so. The insertions of the flexor sublimis and interossei were easily lifted off the bone along with the periosteum and enough bone was removed to get a gap of half an inch after excision.

AN UNUSUAL CASE OF CUT THROAT

By MIN SEIN, M.B. (Cal.), M.R.C.P. (Lond.)
CAPTAIN, I.M.S.

Second Physician, General Hospital, Rangoon, and
Lecturer in Medicine, Burma Government Medical
School, Rangoon

A Hindu male, aged 30 years, was dismissed from his appointment as a police clerk in Jaipur police station in May 1935. He came to Burma and worked as petition writer in Pyuntaza post office from where he was also dismissed. He became a *Sadhu* in December 1935 and roamed about the country. On the 8th January, 1936, some unknown men were said to have attacked him with *dahs* and inflicted a severe cut-throat wound and a large incised wound on the penis. He was said to have struggled along for three days with these injuries and reached a hut and from there he was brought by the police to Shwegyin civil hospital. The wounds were described on his history ticket as follows:—

'1. A long incised wound on front of penis, muscle deep; wound is full of maggots.

2. Incised wound $6 \times 1\frac{1}{2}$ inches and cutting the larynx and pharynx through above the thyroid cartilage'.

The wound in the throat stitched up and a laryngotomy tube inserted. The patient was very emaciated. His eyes were sunken and with the gaping throat the wound presented a horrible sight. He could not make himself understood because he had lost his voice. Only after the wound was stitched up and bandaged and the patient kept a hand on it, could he produce a feeble whisper. He was given rectal feeds. Three days later the wound in the neck became septic, discharging pus freely and the stitches gave way and had to be removed. The patient was then fed through the neck wound. On the 19th January, 1936, nasal feeding was tried and proved to be satisfactory. The patient gave trouble, refused to accept food and tried to run away.

(For the above notes I am grateful to my assistant at Shwegyin, Dr. Hans Raj.)

The patient was transferred to the Headquarters civil hospital, Toungoo, on the 22nd January. The journey took about 10 hours.

On admission the wounds were described as follows:—

'1. One septic incised wound on the upper part of the neck extending from one angle of the jaw to the other cutting through the throat above larynx and oesophagus partially.

2. Incised wound at root of penis, one inch broad'. The patient was in an extreme state of emaciation due to starvation. The first photograph was taken after the patient had been in hospital for about ten days. He was too weak to sit up and could not even hold his head up. Physical examination was otherwise



negative. The following structures could be identified as having been cut—skin, platysma, suprathyroid muscles, thyro-hyoid membrane, part of sterno-mastoids and epiglottis. The posterior wall of the pharynx was exposed and the retraction of the skin had exposed the upper part of the thyroid cartilage.

The patient was fed through the wound with a tube and funnel and seemed to be perpetually hungry. Four pints of milk with eggs, sugar and glucose were given



each day. The wound became quite clean and the patient's general condition improved day by day. On 20th February the wound was stitched up under local anæsthesia; the base of the epiglottis was also pulled down and stitched into place as I imagined that this

procedure would be necessary for the proper performance of swallowing. The head was kept hyperflexed. The patient received food surreptitiously from neighbours and developed a cough which burst several of the sutures. As bleeding occurred from the raw areas, the other stitches had to be removed to facilitate pressure on bleeding points by the dressing. Having read in the *Medical Annual* of 1928 and of 1929 notes on treatment of gaping wounds by skin traction and adhesive strapping, I decided to try the method in this case. The edges of the wound were kept approximated by sticking plaster and bandage and the patient was enjoined to keep the head flexed and placed in the propped-up position. He was fed through the nose quite easily. His weight and general condition improved steadily and the wound also became smaller and smaller. By 2nd April, only a small hole was left in place of the previous gaping wound. This is shown quite clearly in the second photograph which was taken about this time. He was discharged from the hospital on the 14th May with only a small scar left to indicate the wound.

Commentary

More on account of worry due to precarious livelihood than to any other cause, the patient must have developed suicidal mania, and mutilated himself and attempted to commit suicide by cutting his own throat. It was sheer good luck that the big vessels in the neck escaped division. This might be explained by the fact that in his frenzy in attempting to make a good job of it, he hyperextended his neck, thereby pushing the big vessels posteriorly in the level of the wound. My idea that anatomical result should be perfect to enable the swallowing act to be normal was proved to be wrong because in spite of the fact that the cut ends of the epiglottis were not united swallowing was normal and no solid or liquid food entered the trachea.

The ease illustrates the utility of approximating the edges of a wide wound by means of plaster or other means to promote healing.

SPONTANEOUS SUBARACHNOID HÆMORRHAGE

By C. K. MENON, M.B., B.S.

Honorary Assistant Surgeon, Government Headquarters Hospital, Calicut

PATIENT, male, aged 22 years, was admitted into the Government Headquarters Hospital, Calicut, on 20th September, 1938, at 10-30 a.m. with severe headache and restlessness.

The history was that on 17th September at about 8-30 p.m. the headache started suddenly and became intense in a few minutes. He vomited the food he had taken a few minutes previously. A doctor was sent for who gave an injection. The patient's condition was so upsetting that within a few minutes another doctor was called in and gave another injection without any benefit. What was injected is not known. The patient continued in this state of agonizing headache till next morning, when yet another doctor was called in under whose care he remained for two days with no improvement. On the 20th morning he was admitted into the hospital.

Previous history.—Four months ago he had a fall from a height of about 20 feet hitting the left side of his head on the ground. He was unconscious for ten days and when he recovered he had lost the vision of his left eye with no other sequelæ.

On admission, temperature 97.4°F., pulse 54, blood pressure 110/84. Patient was confused, pupils dilated.

Motor system—power fair, no atrophy, tone normal. Reflexes—deep—no response; superficial—abdominal absent.

Sphincters—normal.

Sensation—normal.

Kernig's sign elicited; stiffness of neck present but no retraction.

Other systems—normal.

Urine—1005, acid, no albumin, no sugar.

Ophthalmic surgeon's report:—The right eye was homotropinized and examination did not show any peculiar feature. No papilloedema, pre-retinal and sub-hyaloid hæmorrhage absent.

Ptosis with slight exophthalmos present.

The acute onset with subsequent meningeal irritation led me to do a diagnostic lumbar puncture when blood was found intimately mixed with the cerebro-spinal fluid. Accidental contamination was ruled out by allowing the fluid to stand for a few hours when it was found that there was no clotting but only a little sediment with a column of clear yellow fluid above. A diagnosis of spontaneous sub-arachnoid hæmorrhage was made.

Subsequent progress. The lumbar puncture relieved the headache and the patient felt better.

21st September. Restless and complaining towards the evening. Temperature 101°F., pulse 96, respiration 26 per minute. Morphia was given and a fair night passed.

22nd September. Still complaining but lumbar puncture was not done for fear of removing too much fluid and continuing the hæmorrhage. Morphia relieved the patient. Temperature 100°F., pulse 70, respiration 24 per minute.

23rd September. Lumbar puncture was done and 20 c.cm. of blood-stained fluid withdrawn. It was under pressure but bleeding was being arrested as shown by the lighter colour of the fluid. This puncture seemed to have a better effect than the first. Temperature 99°F., pulse 61, respiration 24 per minute. Morphia was not given.

24th September. Patient better though still complaining of pain. Morphia was given at night. Temperature 99°F., pulse 80, respiration 24 per minute.

From then onwards he improved steadily though still complaining of headache and pain in the right eye.

3rd October. Another lumbar puncture was done and this time though the fluid was still under pressure it was almost clear to the naked eye.

He was discharged on 6th October at his request, with practically no pain.

An important feature of the case in the later stages of the illness was the mental symptoms with loquaciousness.

I report this case so that the definite clinical entity of subarachnoid-hæmorrhage may be more readily recognized by the general practitioner as a fairly common occurrence. The condition, if recognized, is easily handled and if not diagnosed is often wrongly treated.

One difficulty in such cases is to decide how often lumbar puncture is to be repeated. In the early stages when bleeding is going on, it should only be done for diagnosis and to prevent death from medullary compression. In the later stages only sufficient fluid should be taken to relieve the headache.

The commonest causes are :—

- (1) rupture of an aneurysm,
- (2) unexplained sudden rupture without aneurysm formation,
- (3) hæmorrhage from a tumour which impinges upon the cortex or upon the ventricular wall,

(4) bleeding diseases,

(5) trauma.

It is probable that the trauma he sustained 4 months before caused this condition.

My thanks are due to Major S. T. Davies, I.M.S., Superintendent of the Government Headquarters Hospital, Calicut, for his advice and permission to publish these notes.

[Attention is directed to a note by Dr. R. N. Chaudhuri on this subject in our August number of 1938 (p. 466).—EDITOR, I. M. G.]

A CASE OF ALKAPTONURIA ASSOCIATED WITH OCHRONOSIS AND PURPURIC RASHES

By B. B. BHATIA, M.D., M.R.C.P. (Lond.)

Physician, King George's Hospital, Lucknow

ALKAPTONURIA is a rare disorder; alkaptonuria associated with ochronosis being still rarer, there seems enough justification for publishing the following case :—

A male, aged 60 years, non-vegetarian, farmer, was admitted into King George's Hospital on 20th September, 1938, with vague pains all over the body, pain



Photograph shows swelling of the knee-joints, scars of old ulcers on knees and shins, patchy pigmentation of palms, brown coloration of the toe nails.

and limitation of movements in the knee-joints and inter-phalangeal joints. The duration of these complaints was ten years; for the first six or seven years he was able to carry on with his work, but later on had to give it up and has been bedridden for the last two

years. There was nothing of importance in the past or family history.

On examination it was discovered that the patient was covered with cutaneous and subcutaneous hæmorrhages. At two or three places in the hands and legs, the hæmorrhagic patches had gone on to ulceration. Both the legs were covered with scars which, according to the patient, were due to ulcerations following previous hæmorrhages. The palms of the hands were very much thickened and had patches of peculiar slaty-blue pigmentation, the hollows of the ears also presented similar coloration. Knuckles were pigmented and the nails were of uniform brown colour. There were a few brown flecks on either side of the cornea in both eyes. Both knee-joints were swollen, with marked creaky sensation on movement, which was restricted. No evidence of fluid in the synovial sacks. There was slight swelling and restriction of movement in all the inter-phalangeal joints. The rest of the joints appeared normal, nor was there any history of their having been involved in the past. There was some hardening and pain in the calf muscles.

The peculiar distribution of pigmentation and arthritis suggested the possibility of ochronosis. This was confirmed by the examination of the urine, which revealed changes typical of alkaptonuria.

Urine examination.—Fresh specimen was straw colour, specific gravity, 1020, no albumin, reduction of Fehling's solution + +, no casts, no bile pigments or salts. On addition of strong alkalis, colour changed to dark brown. On addition of dilute ferric chloride transient blue coloration was produced. An hour old specimen presented dark brown colour.

Blood examinations.—

Wassermann reaction—completely negative.

Bleeding time—2 minutes 20 seconds.

Coagulation time—2 minutes.

Blood platelets—310,000 per c.mm.

Blood calcium—10 mgm. per 100 c.cm.

Red blood cells—3,670,000 per c.mm.

White blood cells—15,810 per c.mm.

Differential—

Polymorphonuclears—74 per cent.

Lymphocytes—23 per cent.

Eosinophiles—3 per cent.

Hæmoglobin—65 per cent.

X-ray report.—Radiologically scurvy not indicated. Calcified arteries present on both sides. At the knee-joint, inter-articular space considerably narrowed, with destruction of articular cartilage.

Smear after prostatic massage. Negative for gonococci.

Discussion

The changes found in the urine were typical of alkaptonuria. Probably the patient had this disorder from his birth, as he gave the history that, ever since his childhood, he had noticed that drops of urine left dark stains in his clothes. No family history of such disorder in other members was obtained. One grown-up son of the patient, who happened to be in the wards at the same time suffering from rheumatic heart disease, showed no changes in his urine. Staining of the cartilages of the ears, cutaneous and sub-cutaneous staining evident on his knuckles and palms and its peculiar slaty-blue colour were typical of ochronosis. There was no history of any application of carbolic acid to any of his ulcers. Thus the cause of his ochronosis was the presence of long-standing

disorder of metabolism (alkaptonuria). The patient had suffered from occasional dysuria for several years, but the main symptoms which brought him to the hospital—vague pains all over the body, and arthritic condition of the knee, and inter-phalangeal joints—were of ten years' duration and were getting gradually worse. Staining of the tissues and purpuric rashes appeared at the same time. It thus seems reasonable to assume that all these changes followed the deposition of homogentistic acid pigment in the tissues. Staining and arthritic changes have been previously described, but, from the literature available in Lucknow, I could find no records of purpuric rashes occurring in this disease. All the well-known causes of chronic hæmorrhages were thought of, but none fitted with the clinical picture. Vitamin-C content of his urine was normal. The various blood tests, such as bleeding time, coagulation time, platelet count and blood calcium, were within normal limits. The only positive test was the capillary resistance test of Hess; armlet of blood-pressure instrument placed round the upper arm for five minutes at pressure of 110 mm. of mercury midway between the systolic and diastolic figure produced a crop of hæmorrhages on the forearm. This test implied that changes in vascular endothelium were mostly responsible for his hæmorrhages.

Could these changes have been brought about by homogentistic acid?

LIQUOR ARSENICALIS IN THE TREATMENT OF CHOREA

By K. G. RAMABHADRAN

Madura

LEONARD WILLIAMS observed on pages 356-8 of his book *Minor Maladies and Their Treatment*, 'The treatment of chorea by large doses of arsenic was invented by an unqualified practitioner, who, on his death-bed, disclosed the secret of his success to Dr. Murray'. The secret was this: 'Fowler's solution, in 15 to 20 drops doses, might generally be given to children from 10 years old upwards for a few days without disturbing the stomach and that so given it was an almost infallible cure for chorea within a week'. Dr. Murray's own observations confirmed the value of the drug so given, but he insists that two rules should be observed. The one is that the minimum dose should be 15 drops of Fowler's solution, the other that the treatment should not be continued for more than one week.

A trial extending over several years enables me to speak with some assurance as to the efficacy of this method. It does good in the large majority of cases; in some instances it is brilliantly successful, and in a few cases it fails completely. But I do not agree that it is essential that the treatment should be stopped on the eighth day. I have, indeed, found that to do

this, is often to lay down the weapon just as it commences to be operative; that it is in fact during the second week of large doses that the symptoms yield. It is of course necessary to warn the parents' attention against signs of intolerance during this second week. I have found, further, that absolute rest in bed, combined with a diet from which fish, flesh and fowl are rigidly excluded, greatly increases the prospect of cure by this, or by any other method. Finally, I have found that the addition to the mixture of large doses (20 minims to 1 drachm or more) of liquid extract of ergot, as suggested by Dr. Eustace Smith, notably increases the percentage of cures.

Case I, August 1936.—A girl, aged 12 years. She was very intelligent and she was overworked in the home. Jerks were very severe, and in almost the whole of the body. She had sleepless nights. Luminal, veronal and allied drugs had practically no effect. Injection of morphine had to be given to obtain a few hours' rest. The following mixture was then tried:—

R Liquoris arsenicalis	..	..	℥ 15
Potassii bromidi	..	..	gr. 30
Syrupi aurantii	..	..	oz. 3
Tinctura cardamomis co.	..	..	℥ 30
Aque chloroformi	..	..	oz. 3

On the second day liquor arsenicalis was increased to 20 minims and on the third to 30 minims at which it was kept for a week. Some improvement in the patient's condition was noticeable and the mixture was continued for another five days, and then stopped. The girl improved rapidly and there has been no recurrence since.

Case II, November 1936. A boy, aged 11 years, son of a clerk. He was an intelligent boy and was studying away from his parents under the care of relatives who are alleged to have persistently ill-treated him. The patient was brought down by his parents a few days after the onset of the attack. There was partial paresis in the right upper and lower extremities and the symptoms were typical of a severe attack of chorea. The tonsils were slightly inflamed. A purgative followed by the mixture with 30 minims of liquor arsenicalis and bromides were given. This was continued for 10 days and the symptoms lessened considerably. After an interval of 10 days the same mixture was resumed, this time with the addition of a full dose of extract of ergot. The boy got much better. Slight weakness in the extremities was remedied by the administration of general tonics for a period of two months. There has been no recurrence since.

Case III, September 1938. A girl, aged 10 years. The patient was sleeping in the afternoon when she was suddenly awakened by her mother. As she got up her right hand began to shake violently. Weakness in the right leg developed and there were twitchings on the right side of the face. On examination the pulse was rapid (105 per minute) and the temperature was normal. There was a systolic murmur with its maximum intensity in the pulmonary area.

About four years previously the child had had typhoid fever lasting for 22 days. Since then once every year during the rainy season she developed slight breathlessness and cough accompanied by slight rise in temperature and pain in the joints. In each case the symptoms used to last only for three days and the child got completely better. Since last year's (1937) attack she used often to complain of pain in the left side of the chest and back and neuralgia in the head. The child is very intelligent, and is top of her class.

Liquor arsenicalis, 24 minims a day, was started along with bromides and tincture of digitalis. The patient was put to bed and given plenty of glucose. Luminal was given for sleep. On the third day the

dose of liquor arsenicalis was increased to 30 minims. Tincture digitalis was stopped after a week, but the liquor arsenicalis was continued for 15 days. The child began to improve from the third day and is now completely recovered. The pulse rate has come down to 80 and the murmur in the heart has disappeared.

HYDROPHOBIA FROM A MONGOOSE BITE

By B. M. ROY, L.M.F.

Assistant Medical Officer, Nonaipara Tea Estate,
Dimakuchi, Assam

On 26th September, 1937, I was called to see a Nepali boy, aged 12 years, in the Bhutan border who was suffering from fever with delirium.

On examination I found the temperature 103.4°F.; pulse and respiration in proportion.

Lungs—no adventitious sound.

Liver—normal.

Spleen—2 inches below costal margin.

Urine—high coloured.

Blood examination—*Plasmodium falciparum* found.

Aldehyde test negative.

Hæmoglobin—about 50 per cent.

The father of the patient said that the boy had been delirious the whole night.

The usual malaria treatment with a purgative was given and a cold douche over the head was ordered if and when the temperature rose.

Next morning the temperature was 102.8°F. Bowels acted well, but some new symptoms had developed, painful spasm of pharynx while attempting to swallow anything. The throat was examined but nothing noticed. The patient was kept under careful observation and in the afternoon the following symptoms developed: clonic spasm of the respiratory and neck muscles, sense of constriction of the fauces, swallowing even a little water was difficult, frightened appearance, but could answer questions clearly.

28th September.—The condition was somewhat aggravated. A peculiar sound was emitted when he wanted to expectorate. Swallowing any food was impossible, even the sound of any liquid gave him a convulsion. These signs led me to enquire if the boy had ever been bitten by a dog. The father said no, but about a month before while working with him cutting jungle near their house, the boy was bitten in the hand by a wild mongoose. The animal was then killed by the father and the four teeth marks in the boy's hand were dressed with pulverized turmeric, which resulted in quick healing without any visible scar, within a few days.

29th September.—The face was expressionless, signs of paralysis of lower jaw, irregular breathing, excessive secretion of saliva which he could not expel and which was dribbling from the angle of the mouth. He could not answer any questions and both pupils were widely dilated.

The patient died at about 2 a.m. in the morning with complete paralysis.

Conclusion.—It is I think a typical picture of hydrophobia.

Can a mongoose be responsible for hydrophobia?*

I am grateful to Dr. E. Burke for his permission to send this case note for publication.

*[Note.—We refer our readers and the contributor of this note to Vol. LXVII, p. 451, and Vol. LXVIII, p. 20, of the Gazette in which details of 10 cases of rabies from mongoose bites are recorded.—Editor, I. M. G.]

Indian Medical Gazette

MARCH

THE VITAMINS: NICOTINIC ACID AND PELLAGRA

Writing contemporary history is always an exceedingly difficult task; the history of scientific advances provides no exception to this general rule. For example, who first discovered vitamins? There is of course no satisfactory answer to such a question, and, in giving the names of half a dozen workers in whose brains the ideas that have grown into the extensive, though still far from complete, knowledge that we now enjoy first germinated, we are conscious that there are many others whose contributions though less spectacular were equally important. Discoveries are no longer made by an isolated worker behind locked doors, but ideas are passed rapidly from scientist to scientist, each adds his quota, and thus knowledge, which a hundred years ago would have taken several decades to develop, now takes only as many months. A quarter of a century ago our total knowledge on the vitamins could have been written on a postcard, whereas to-day 'a concise review of modern knowledge about vitamins' appears not in one but in seven volumes.

In order to evaluate the contributions of different workers in this field, it is necessary to appreciate that there are certain definite stages in the development of our knowledge on vitamins. Firstly, the existence of certain diseases, scurvy, beri-beri and rickets, was observed and it was noted they were associated with obvious defects in the diet of the sufferers. It was then found that these diseases were associated with the absence from the diet of certain specific food substances, very small quantities of which added to the diet would prevent and even cure these diseases, which were therefore called 'dietary deficiency diseases'. In the next stage it was shown that life—of animals including man—cannot be maintained on a basic diet of purified protein, fat, carbohydrate, minerals and water, but that the addition of minute quantities of a number of other substances is essential; the source of these substances and certain crude facts regarding their general chemical and physical properties, e.g., rate of oxidation, water solubility and heat stability, were known, but nothing more regarding their nature; this is evident from the first name given to them, 'vitamines', afterwards changed to 'vitamins' to mark the recognition of the mistake, when it was discovered that they were not 'amines'. The next was a stage of multiplication of these vital substances when the original four were split up into the dozen or more of the present day. And the final stage is

the chemical identification and synthesis of these vitamins; this stage is of course not yet complete.

One realizes that if in each of the early stages of the development of the subject some half dozen or so workers played important parts, then for the later stages the number will have to be raised to hundreds, and before the picture is anything like complete to thousands. Out of this galaxy the historian of the distant future will no doubt pick some special names to honour, and at least he will not be hurting the feelings of any living scientist or his immediate associates, but we doubt if he will be getting any nearer the truth than we could hope to do to-day.

To-day it is the chemist who occupies the centre of the vitamin research field, and during the last few years remarkable advances have been made in the chemical identification of the vitamins. There are now at least nine vitamins, or pre-vitamins, of which the exact chemical formula is known; these include vitamin A and carotene, ascorbic acid, two vitamins D, vitamin E, vitamin B₁, and of the vitamin B₂ complex, lactoflavin and finally nicotinic acid. The importance of this exact knowledge is evident, even if we leave out of consideration the fact that identification is obviously an essential step in the synthesis of these substances.

Nicotinic acid, the most recent recruit to the vitamins whose chemical formula is known, provides a very good example. Many theories have been put forward regarding the cause of pellagra and, although the general opinion has for some time been veering towards Goldberger's pellagra-preventing (P-P) factor deficiency theory, the subject was still a controversial one. Now, since nicotinic acid has been identified as the P-P factor, within a year the whole aspect of the subject seems to have changed, and the part played by this substance in preventing and curing the symptoms of pellagra is so well understood that response to nicotinic acid is now being used as a therapeutic test, and symptoms that do not respond to this treatment are considered not to be part of the true pellagra syndrome.

In September 1937, Elvehjem and his co-workers reported that nicotinic acid cured black-tongue, a condition in dogs that previous work had shown to be analogous to pellagra in man, and before the end of the year three independent groups of workers, including Harris in Cambridge, had reported good results in human pellagra with nicotinic acid, even when the patients were allowed to continue their pellagra-producing diet. The next twelve months produced a score or more convincing reports on the therapeutic value of nicotinic acid and seldom has any therapeutic measure received such a consistently good 'press'. A few warning notes have been sounded, but no serious results, even from gross overdosage, have been reported, and its therapeutic limitations seem only to be encountered beyond the true pellagra syndrome.

One observer has killed a dog by giving it 2 grammes of nicotinic acid daily for 13 days, and others have produced 'very disagreeable symptoms' in healthy students by giving them a gramme a day for ten days. However, as the maximum therapeutic dose recommended is about 500 mgm., these dosage limitations are unimportant. The general opinion is that a dose of 200 to 300 milligrammes by mouth, or of 100 mgm. parenterally, is usually adequate.

Another point raised is that vitamin B₁ is a necessary addition when neuritis is a prominent symptom, and many workers add that in order to ensure permanence of cure a good protein diet is advisable.

Few contributions of the biochemist to the study of the vitamins have had such an immediate and spectacular clinical reaction, as the isolation and chemical identification of the pellagra-preventing factor.

Special Articles

THE YELLOW FEVER POSITION*

By SIR ALEXANDER J. H. RUSSELL

COLONEL, I.M.S.

Public Health Commissioner with the Government of India, New Delhi

ON two previous occasions, my predecessor gave at these Conferences a brief description of the yellow fever position in so far as it affected India. Our new knowledge of that disease, the great development of air traffic which has occurred during the past few years and the certainty that still wider developments will be made in the near future seemed to me to justify the presentation to you of a picture of recent events and of the precautions which are now being taken.

A most welcome feature of more recent times has been the wider recognition of the danger of the spread of yellow fever to countries hitherto free from that disease. The change of outlook among certain delegates to the Office International has been most striking, and this I attribute in great part to the stiff attitude adopted from the first by the delegates from India. I have been called an 'enfant terrible' and an obstructionist in at least one meeting of the 'Office', but we have persisted in our efforts and there is now general agreement with the Indian point of view. Moreover, civil aviation departments and air companies in general, after a readily understandable hesitation, have now come to a fuller appreciation of the dangers to public health implicit in rapid air transport and these organizations are now working in friendly co-operation with public health departments in every part of the world in the effort to prevent the spread of disease by infected persons and insects. The Rockefeller Foundation has once more placed the whole world under a deep debt of gratitude by its magnificent work not only in respect of extension of our knowledge of the epidemiology of yellow fever but also in organizing systematic preventive campaigns in endemic areas.

Some of the new facts which have come to light in recent years are of great interest and importance. For instance, it has been possible to reproduce in *Macacus rhesus* the signs and symptoms of human cases and so to make an intensive study of the disease in experimental animals. It has also been proved that microscopic sections of the liver tissue of a yellow fever case present characteristic signs by which a diagnosis can be made; by means of a simple instrument known as the viscerotome portions of liver tissue can be obtained without carrying out a detailed post-mortem examination.

Further it is now possible by the elaboration of what is called the mouse-protection test to determine whether or not any given person has previously had an attack of yellow fever. The extended application of the mouse-protection test, using the sera of persons living in suspected regions, has made it possible to map out the boundaries of endemic areas and of what are known as the 'silent' areas.

Finally, experimentation over a period of years has resulted in the elaboration of a technique which permits of the production of a potent protective vaccine—one which in its latest form does not produce the jaundice and other toxic symptoms which followed injection of the earlier types of vaccine.

From field and laboratory studies in America and Africa, our ideas of the epidemiology of yellow fever have undergone a remarkable transformation. Yellow fever was until recently believed to be solely an urban and coastal disease, its incidence being thought to be dependent on the presence of *Aedes aegypti*, which was the known transmitting agent. The disease was diagnosed from what was assumed to be a classical syndrome and the absence of typical cases was interpreted as meaning freedom from infection. Studies of the viscerotomy liver sections taken from all persons dying from fevers of over ten days' duration and the application of mouse-protection tests have established that 'definite and recognized clinical cases only form a very small proportion of the cases of yellow fever' occurring in an endemic area. It is the mild unrecognized cases which keep infection

* Delivered at the 16th All-India Medical Research Workers Conference, New Delhi, December 1938.

going on, because they frequently remain undetected, they therefore constitute a grave danger in respect of spread of the disease.

South America

In South America, the urban and coastal type of the disease was that which was the object of vigorous preventive measures for many years.

Within the last two to three years, however, a new type known as jungle yellow fever has been found to exist. This type differs in many respects from that originally described and Dr. Soper, the Rockefeller Foundation authority on yellow fever, considers it to be the older and more permanent form of the disease. Dr. Soper describes it as follows:—

‘Urban and rural *ægypti*-transmitted yellow fever is generally acquired indoors, tends to affect non-immunes of all ages, spreads along the lines of human travel, and is easily controlled by reduction of the density of the vector. Jungle yellow fever, on the other hand, is acquired in or near the forest during working hours by those whose occupation takes them to the woods and does not affect other members of the household. The infection of men is apparently accidental, occurring in the course of some cycle of infection of which man is not an essential part. Recently forest mosquitoes (*A. leucocelænus*, *Hæmagogus capricorni* and species of *sabathines*) have been captured naturally infected and furthermore there is some evidence that certain monkeys commonly become infected; but it is difficult to fit all the observed facts into a simple mosquito-monkey-mosquito cycle of which man's infection is but an accidental offshoot’.

Whereas, therefore, yellow fever was previously considered to be confined to coastal regions, it is now known to be widespread through vast inland areas of the South American continent and at the moment the problem of its eradication seems outside the bounds of practicability.

Africa

In Africa, it had also been long believed that the endemic yellow fever areas were relatively restricted. The surveys made by using the mouse-protection test have revealed that the disease must have prevailed over much wider tracts of that continent and, in fact, the eastern boundaries of what have been termed the ‘silent’ areas are gradually being extended more and more eastwards as further surveys are carried out. It may well be that these areas are ‘silent’ only—because of the absence of medical aid and the lack of facilities for carrying out the necessary laboratory and animal tests.

From the point of view of India and the Far East, the African endemic and ‘silent’ areas must be looked upon with equal suspicion and in face of stubborn opposition we have persistently maintained that the same preventive measures must be applied in respect of both.

The map of Africa [not reproduced] shows the various spots where cases of yellow fever have recently been found and it also indicates the known ‘silent’ areas. The main endemic foci are of course in West Africa, but within recent months, two very suspicious cases have been recorded as far east as Malakal, in the Anglo-Egyptian Sudan, where lies an aerodrome on the Cape to Cairo air route.

On the same map has also been drawn the main air routes in the African continent, but of course these are being rapidly extended and it is not too easy to keep the map up to date. The main British route runs from Alexandria to Cape Town and the West African line from Lagos and Kano crosses through a well-known endemic area before joining the main route at Khartoum. During my visit to Egypt in March of this year, by the courtesy of the Egyptian Government and of the International Sanitary and Maritime Quarantine Board of Egypt, I was given the opportunity of inspecting the aerodromes at Alexandria and at Cairo and of seeing the precautionary measures taken by the health authorities at these important airports.

For the last two to three years, the Egyptian Quarantine Board has been carrying out all necessary measures, including disinsectization of aircraft with Pyrocid 20, for the prevention of spread of yellow fever to the north and east. By arrangement with the Government of India, too, the Board agreed to issue certificates of disinsectization to all aircraft coming from infected or suspected yellow fever areas which were proceeding to India and in addition the Director of the Board sends a telegraphic warning to the Airport Health Officer, Karachi, in respect of any passenger proceeding to India by air within nine days of having left an infected or suspected yellow fever area. In return we send telegraphic information in respect of any suspected passenger leaving a cholera- or smallpox-infected area in India by air for the West.

With the opening of the Lagos-Khartoum air route in 1937, it was obvious that the danger to India was enhanced unless stringent precautions were taken and that Khartoum had become the key position for the sanitary control of north-bound air traffic.

During a visit I paid to Khartoum at the end of March, I was able to discuss the whole question with the Anglo-Egyptian Sudan Government and their Director of Medical Services. The Sudanese authorities are very much alive to the necessity for taking all possible precautions against a yellow fever invasion and the measures taken there, in my opinion, provide a valuable and effective barrier to the extension of infection to other countries including Egypt, Iraq and India. I was informed that the *Aedes ægypti* had never been found in Khartoum, and that every step was in force to prevent its introduction there, while an intensive anti-*Aedes* campaign was being carried out in every large centre in the Sudan.

It was fortunate that my visit to Khartoum coincided with the arrival of a Lagos air liner bringing ten passengers across the African continent. The Sudan Government has made arrangements with the West African Governments under which no air passenger is permitted to leave those countries for Khartoum and Egypt unless he has resided in a yellow-fever-free area for at least six days immediately prior to embarkation and each passenger must be in possession of a certificate to this effect signed by the Airport Health Officer of the port of embarkation. On arrival at Khartoum, each passenger must produce this certificate, as I saw for myself, and unless it is presented, the passenger is not allowed to proceed but is detained under surveillance for six days. A few days before my visit, an English banker, who had arrived at Khartoum from Kano without the certificate, was detained for six days before he was allowed to proceed to Cairo and Europe. After the passengers had disembarked and before the removal of baggage, mails or passengers' effects, every compartment of the machine was thoroughly fumigated with Pyrocid 20 and, having seen the methods adopted, I felt convinced that no mosquito could possibly escape with her life. The Airport Health Officer at Cairo also informed me that if, on interrogation, a passenger was found to be on his way to India, he was not allowed to proceed unless he was in possession of the necessary certificate.

Whilst, however, we may be assured that suitable preventive measures are in force against the danger of the spread of yellow fever to India, it must be remembered that no insurmountable defensive barrier has been built up. The change from land planes to sea planes has rendered control of aerodromes much more difficult. It will be obvious that a land aerodrome can be kept free from *Aedes* much more easily than a marine airport. Moreover, private aeroplanes will without doubt become an increasingly important factor as these machines have frequently no definite route and may cross and re-cross infected areas without the cognizance of any health authority. For example, a private air line, with headquarters at Aden, is now operating between Massowa, Port Sudan, Djibouti and Baghdad, the machines landing at any convenient aerodrome. I may add that the late Miss Amelia Earheart during her ill-fated world flight made no call at Khartoum on her way across Africa and so escaped detention there after her flight across the yellow fever infected areas of West and Central Africa. Private aeroplanes may also intentionally or unintentionally enter India through airports other than Karachi, the authorized port of entry, and thus land in a place which is not equipped to take the necessary precautionary measures. Finally, although as far as is at present known, the most easterly infected region in Africa is Malakal in the Anglo-Egyptian Sudan, any spread of infection to the ports on the east coast of Africa

would be attended with very serious consequences because, as Dr. Soper has said, 'every boat headed for India would become a definite threat'.

India

As regards this country, considerable progress has been made in the measures designed to prevent the introduction of yellow fever. In 1936, the Government of India issued regulations which prohibit entry to any aeroplane which has started from or alighted in an infected or suspected area within the previous nine days. The same rule applies to any person who has started from or alighted in an infected or suspected area, except at an anti-amaryl aerodrome, within the previous nine days, unless he has been protected by satisfactory inoculation or by a previous attack of the disease. The Aerial Navigation Sanitary Convention lays down six days as the period of prohibition of entry and considerable criticism was made of India's insistence on nine days, but there are good reasons for this extension and we cannot afford to take any risks so long as we have free breeding of *Stegomyia* all over India, a non-immune human population and a vast reservoir of monkeys now known to be susceptible of carrying the disease.

Karachi is the airport of entry to India for all air traffic coming from the West. The aerodrome there may now be classed as 'anti-amaryl' according to the Convention, as suitable steps have been taken to provide the airport with a health staff and to keep the *Aedes* index at a minimum. Adequate provision has also been made for the segregation of suspected or infected persons arriving by air, a 12-bedded mosquito-proofed isolation hospital having been built on the outskirts of the aerodrome. A mosquito-proofed ambulance is also available for the transfer to this hospital of suspected persons arriving at the marine airport.

In regard to protection by inoculation with the yellow fever vaccine, arrangements have been made with the Wellcome Research Laboratory in London to give training in the method of inoculation to public health and medical research department officers who may be on leave in England. Those who decide to take this training should either apply to the Public Health Commissioner or in London to the High Commissioner for India.

An emergency supply of the vaccine is also being kept at the Haffkine Institute, Bombay, whilst arrangements are being made under which at the Wellcome Research Laboratory in London 400 doses are earmarked for immediate despatch to India. It would be of advantage to India in general and to the medical profession in particular, if medical officers proceeding to England would use the opportunities afforded to learn the method of inoculation and to have themselves protected. If yellow fever should break out here, there will be an immediate demand for a large medical and preventive staff and it would

of course be to their own advantage to be immune to the disease.

Considerable experience has been gained in the use of the yellow fever vaccine. In a recent address to the Royal Society of Tropical Medicine and Hygiene in London, Dr. Soper reported, in connection with the preventive campaign against jungle yellow fever, that as individual immunization of the exposed population alone offered any reasonable hope of prevention 'during the first nine months of 1938 more than 800,000 persons have been vaccinated with entirely satisfactory results and without serious complications of any kind'.

Finally, the question of preventing the spread of the disease by the carriage of infected mosquitoes in aircraft is of the utmost importance. The fumigation of all aircraft coming from suspected or infected areas has been in general practice for the last two to three years. Various fumigants have been used by different authorities, that in use in India and in Egypt being a substance known as Pyroicide 20, which consists of a pyrethrum base diluted with kerosene. Every compartment of the aircraft is freely sprayed with the fumigant before any unloading of baggage, mails, etc., is allowed, so that any mosquitoes may be destroyed. Because of possible danger from fire following the use of a fluid containing kerosene oil, Imperial Airways have recently been experimenting with a new fumigant called 'deskito' which is a watery base preparation of pyrethrum. With this substance it is proposed to carry out the process of fumigation in the air immediately the aeroplane takes off and this method has the obvious advantage that mosquitoes which have gained an entry just prior to departure from an infected or suspected area will be destroyed at once, before they have the opportunity of biting passengers or crew. The use of a thoroughly efficient disinfectant is a matter of great importance to India and we have consistently taken up the attitude that no fumigant will be accepted until it has been submitted to rigorous tests by the Malaria Institute of India.

Even from these somewhat sketchy remarks, you will have appreciated that the Government of India are acutely alive to the danger of the introduction of yellow fever into this country and that, in the light of existing knowledge of the disease, we have taken every possible step to ensure that such a catastrophe may be avoided. The situation in East Africa, however, is one which demands continued vigilance and I think you may be certain that the Public Health Department of the Government of India will continue to maintain its present watchful and critical attitude.

List of areas in Africa regarded as infected with yellow fever or suspected of being infected with yellow fever:—Angola, Anglo-Egyptian Sudan, South of Khartoum, Belgian Congo,

(Continued at foot of next column)

DIET AND PEPTIC ULCER*

By M. NARASIMHA RAO, M.B., B.S.
Formerly Research Fellow in Medicine,
Andhra University, Waltair

THIS short note is not a study of the pathology of the problem, but rather a study of the wider aspects of the subject. I have attempted to show that diet plays a prominent part in the ætiology of peptic ulcer in India.

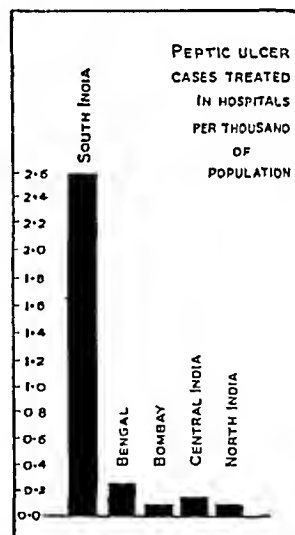
By peptic ulcer, in the following lines, it is meant to represent, not the acute ulcer or the erosion, but the entirely different pathological entity, the *chronic* ulcer, that is commonly found at the following sites of the gastro-intestinal tract in man:—

- (i) the lesser curvature of the stomach,
- (ii) the first and second parts of the duodenum and, rarely,
- (iii) in the case of post-operative gastro-jejunostomy, the first part of the jejunum.

Peptic ulcer is a far more common disease in the south than in the north of India; it is in fact supposed to be 58 times more common (McCarri-

son, 1921). The following graph I (Mc Carrison, 1936) brings out this fact very vividly, and represents the number of peptic ulcer cases treated in hospitals per thousand of population.

GRAPH I



surgical side were cases of peptic ulcer (Rao, 1938b), the corresponding figure for Calcutta was only 1.54 per cent.

* Paper read before the Public Health Society on the 4th November, 1938.

(Continued from previous column)

Cameroons, Dahomey, French Equatorial Africa, French Guinea, French West Africa, Gambia, Gold Coast Colony, Ivory Coast, Kenya Colony, Liberia, Nigeria, Senegal, Sierra Leone, Tanganyika Territory, Togoland, Uganda, Upper Volta Territory.

One can think of various factors for this marked difference and I shall discuss here some of the more important ones.

It is believed by some Australian workers that climatic conditions may be responsible for the causation of the disease. However, in this case, meteorological conditions cannot be responsible, for in South India the incidence of ulcer is almost equally high in all parts in varying climatic conditions, in Malabar and the Northern Circars, in Coonoor and Madras. Similarly, comparing the meteorological conditions prevalent in North and South India, it can be shown that the climatic condition is not an important aetiological factor.

Next the racial factor may be considered. In Travancore and the Northern Circars, a group of four northernmost districts of the Madras Presidency (Rao, 1938b), the disease is more prevalent in the lower castes. And the lower castes in Bengal and North as well as in South India chiefly consist of the orientals and the aboriginals. And the racial distinctions between Bengal and South India, if any, is only in the Dinaric and Armenoid strains and not in the orientals and the aboriginals. Hence, one does not find in the South Indians a racial predilection either.

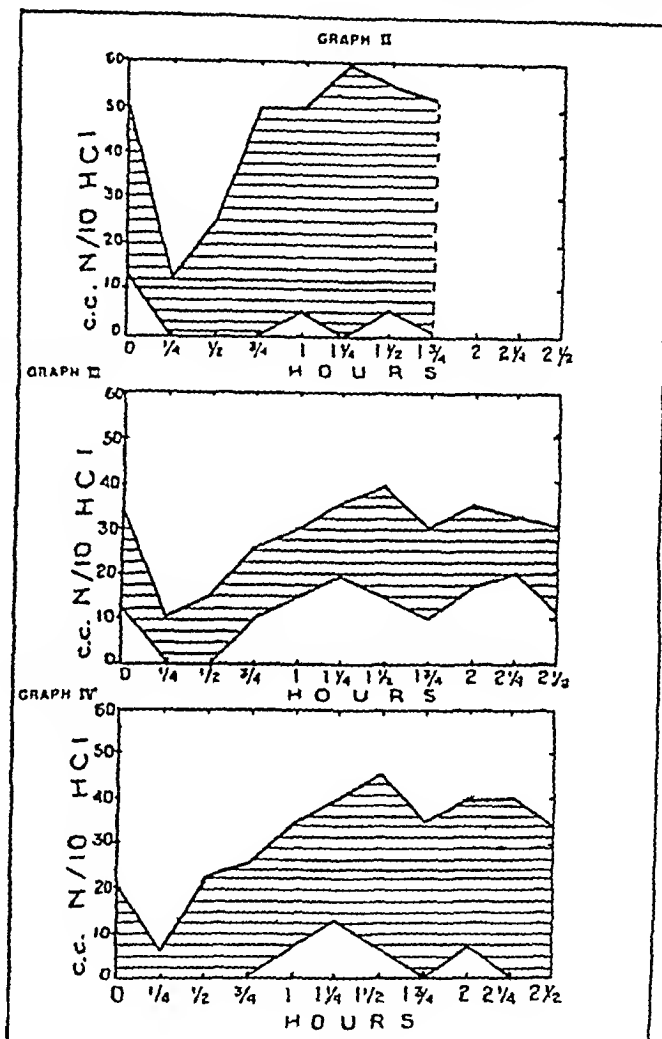
Dietetically, it is more complex on account of various factors.

That the diet to a large extent is responsible for the greater incidence of ulcer in South India has been suggested by McCarrison, and he attributed it to the difference in the nutritive quality of the diet of the people. He substantiates his statement by experimental evidence in which groups of rats fed on diets corresponding to those used by Sikhs and the poorer classes of Madras, respectively, for 700 days showed on post-mortem examination that the first group had no peptic ulcer and the second group had it to the extent of 11 per cent. Even among the South Indian dietaries, predisposition to ulcer formation varies with the dietetic variation in different parts. Thus McCarrison is of opinion that the diet used by the lower classes in Travancore predisposes to ulcer formation more than the diet used by similar class of people in Madras. Gastric ulcers were observed in 11 per cent of the animals fed on a diet corresponding to that of the Madras labourer, consisting of rice, chillies, tamarind kunjee and a little fish, while 27.7 per cent of the animals fed on the Travancore type of diet consisting of tapioca root, rice, red pepper, rice water and a little fish showed ulceration and 11 per cent inflammation of the gastro-duodenal tract.

On the basis of these observations, the dietary details and their possible significance may be outlined. Taking the gastric analysis as a criterion of the response of the gastro-intestinal tract to the dietary habits of the individual the following graphs may be analysed.

The graphs represent the normal limits of the gastric acidity in 80 per cent of the cases

examined. Graph II is that worked out by me from 100 healthy adults of South India (Rao, 1937); graph III (Ghosh, 1937) from 25 healthy adults of Bengal closely resembles that by Napier and Das Gupta (1935). Graph IV, that given as standard by Bennett and Ryle, is shown for comparison. A comparison of the graphs indicates that in the first case the initial and the subsequent rise in acidity is very high and the emptying time far less. Thus it is seen that the South Indian is of hypermotile and hypersecretory type and the Bengali more akin to the normal type as described by Bennett and Ryle.



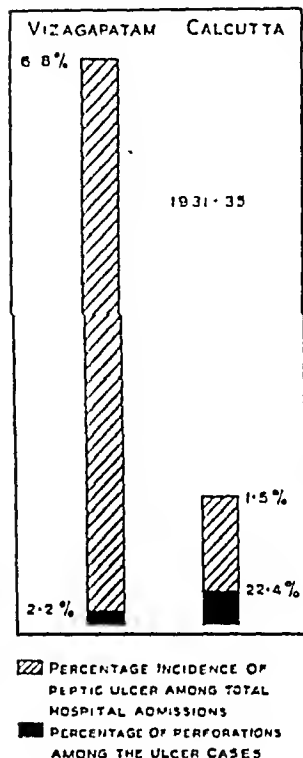
Even the pathological conditions of the stomach at the two places seem to vary to a large extent. Of 537 cases of peptic ulcer in Vizagapatam during the first quinquennial period of this decade, only 12 cases, or 2.2 per cent, perforated into the peritoneum, whereas of 303 cases for the corresponding period at Calcutta 68, or 22.4 per cent, perforated into the peritoneum. Thus, it is seen that the perforating acute type of ulcer is nearly ten times more common in Calcutta and the chronic callous ulcer correspondingly more common in Vizagapatam. This is represented in the following graph.

Thus it is seen that both the physiological and pathological reactions of the stomach, as representative of the gastro-intestinal tract, are

markedly different in the two places. Now that the two are definitely different types, the dietary details of both may be gone into.

GRAPH V

Showing the incidence of perforation among cases of peptic ulcer.



and milk products are a delicacy. The analysis of the diet is given in the following table. Comparative values of Bengal and South India are also given of the people of the same economic status.

TABLE

Showing composition of Indian diets, in grammes

	South India [Aykroyd and Krishnan (1937)]	Northern Circars [Jogiraju (1935)]	Bengal [Wilson and Mittra (1938)]
Protein ..	62.7	79	78.4
Protein, animal ..	..	9	10.8
Fat ..	26.9	15	19.7
Carbohydrate ..	488.9	619	562
Calcium ..	0.31	..	0.47
Phosphorus ..	1.51	..	2.19
Iron ..	0.033	..	0.027
Total calories ..	2,399	2,858	2,743

N.B.—The figures in these columns do not exclude the 10 per cent of wastage.

From the above figures and details one is justified in summarizing the findings as follows :—

The peculiarity of the South Indian diet—

1. The adequacy of the calorific requirements, mainly from carbohydrates.

2. The great excess of carbohydrates.

3. Lack of animal proteins.

4. Deficiency of vitamins in general.

The Bengali diet, according to Wilson and Mitra (1938), is deficient in animal protein and fat, with excess of carbohydrate and adequacy of vitamins, thus differing from the South Indian diet in the adequacy of vitamins only.

The former or the South Indian diet being the diet of the more frequent victim of ulcer may be considered in greater detail. It is the common opinion that the South Indian diet is 'rough' and more highly spiced, which may lead to ulcer formation. But it is quite probable that the human diet in no way approaches the gross 'rough' experimental diet with which ulcers have been produced (Fauley and Ivy, 1930). And the highly spiced diet can be responsible only in one way, i.e., setting up local inflammation. On a routine examination of the stomachs of all autopsies carried out during two consecutive years in Vizagapatam, it was found that gastritis was very rare. Moreover, on a routine examination of the gastric analysis of 150 healthy unselected individuals of the area, on the same diet, in not one case was there evidence of excess of gastric mucus, indicative of gastritis. Hence the improbability of the spiced diet being the aetiological factor.

The inadequacy of the animal protein may next be considered. Peptic ulcer develops only on well-marked reduction in total (Hoelzel and daCosta, 1932a and 1937, and Weech and Paige, 1937) protein intake, as in starvation and not necessarily in that of animal protein. Hence the inadequacy of animal protein, without reduction of total protein, may not be significant. But yet, probably amongst the low-paid labour classes in South India, whose protein consumption is calculated to be as low as 35.9 grammes (Aykroyd and Krishnan, 1937), this factor is to a certain extent responsible, as it has been experimentally proved that in cases of protein restriction, peptic ulcers are more easily developed with excess of carbohydrate intake (Hoelzel and daCosta, 1932). Hence probably the high daily carbohydrate intake of 650 grammes, coupled with a markedly low protein consumption of 35.9 grammes in these low-paid labour classes may be a factor in the production of peptic ulcer. This point requires further clarification.

Of the various amino-acids in animal proteins, Aron claims to have shown recently that histidine deficiency gives rise to peptic ulcers, but his theory is not generally accepted (Rao, 1938a).

Excess of carbohydrate is said to prevent the absorption of the other principles of the diet, but quantitatively it is known that a pure carbohydrate test meal *per se* produces no significant difference in test meal findings from a pure protein or a pure fat test meal (Barrow, 1932). Hence, probably, excess of carbohydrate does not influence the gastric pathology by itself, but

in conjunction with low protein as shown previously.

Regarding the fat-soluble vitamins, the table indicates their marked deficiency.

Though hypomotility of the gastro-intestinal tract is reported in vitamin-D deficiency (Ané *et al.*, 1931), this deficiency may be ruled out in a sunny tropical country like ours, but this does not apply to vitamin A. Deficiency of the anti-infective vitamin predisposes to infection of the gastro-intestinal tract as well as of the other mucous membranes, and if Rosenow's streptococcal theory be accepted there is a fruitful source of ulcer formation, but against this is the fact that hypovitaminosis A on experimental evidence (Woolback and Howe, 1925) gives rise to hyposecretion of the mucous membranes with little involvement of the glandular epithelium or glandular secretion (Verder and Petran, 1937). In typical chronic peptic ulcer, it is the reverse that is commonly seen, namely, a hyperplasia of the active secretory mucous membrane, around the ulcer area. Even in the so-called pre-ulcerous condition—a definite pathological entity—one finds a hyperplasia and hypersecretion. Hence I am of opinion that hypovitaminosis A has no place in the ætiology, though some workers claim that it has (Manville, 1933, and Santi, 1931).

Next passing on to vitamin C, it is proved (Ranganathan and Sankaran, 1937, and Rao, 1938) that avitaminosis C exists fairly commonly in South India, and hypovitaminosis C is known (McCarrison, 1921, and Smith and McConkey 1933) to produce peptic ulcers. It may be argued that if tissues are starved of vitamin C the healing of an acute ulcer may be delayed, the delay in healing being attributed to the damaged endothelium of the vessels, said to be one of the pathological changes in scurvy. It has, however, been shown recently by Bentsáth *et al.* (1936) that scurvy is a deficiency disease caused by the combined lack of vitamin C and vitamin P. According to their conception, it is a group of substances, flavones, tentatively termed vitamin P, that are responsible for the favourable effect on the resistance and permeability of the capillary wall in the pathological conditions. The rarity of genuine reports of scurvy in South India makes one believe that though deficiency of vitamin C is present there is an adequate amount of vitamin P preventing capillary fragility. Hence, probably, avitaminosis C does not play a part in the ætiology of chronic gastro-duodenal ulcers.

Next we come to vitamin B. Webster and Armour (1934) have shown experimentally that it is vitamin B and *not* the other vitamins A, D or C that is responsible for the proper functioning of the gastric glands. Rowlands and Browning (1928) have shown that avitaminosis B leads to atony and visceroptosis. Cowgill *et al.* (1926) have shown on experimental evidence that anorexia and disturbances in action of gastric musculature are symptoms of vitamin-B

deficiency. Rose *et al.* (1930) have shown that these symptoms are not due to any indirect action of the altered carbohydrate metabolism in vitamin-B deficiency, but due to direct deficiency of the vitamin itself. The fact that, in the large majority of hospital cases, the pre-ulcerous condition starts with anorexia and dyspepsia should be noted. Moreover, the gastric atony is commonly seen on the x-ray screen in these patients, and it has been experimentally shown that *prolonged* avitaminosis B leads to gastric atony (Smith, 1927). Moreover, it has been shown by blood pyruvic acid estimations (Rao, 1938c) that a mild hypovitaminosis B exists in these patients from South India.

Prolonged deficiency of vitamin B has been shown experimentally to give rise to gastric and duodenal ulcers resembling those of peptic ulcer in man (Howes and Vivier, 1936, Sure and Thatcher, 1933, 1934, and Sure and Harrelson, 1937).

I will conclude by considering the possible ways by which deficiency of this vitamin may be responsible for the production of ulcers.

1. It has been observed that in vitamin-B deficiency there is a definite increase in hæmoglobin and total blood solids; an increase in blood concentration resulting from either restricted water intake or vitamin deficiency *diminishes* the motor activity of the stomach (Rose *et al.*, 1930a).

2. Not only diminished but also irregular gastric motility is observed in vitamin-B₁ deficiency. This may lead to stasis and putrefactive changes, which evoke abnormal sensory stimuli resulting in pylorospasm (Magee *et al.*, 1929).

3. Degenerative changes were found in the adrenal, in experimental B₁ deficiency, which lead to increased histamine-like bodies in circulation, and a greater susceptibility to ulcer formation.

4. McCarrison observed that the histopathological changes in the intestinal mucosa in general, and gastro-duodenal mucosa in particular, in monkeys fed on an autoclaved rice dietary, chiefly deficient in vitamin B and to a certain extent vitamin A, consisted of—

- (i) congestion and hæmorrhage,
- (ii) atrophy of the myenteron,
- (iii) degenerative changes in the myenteric plexus of Auerbach,
- (iv) atrophic, necrotic and inflammatory changes in the mucous membrane, and
- (v) partial disappearance of the lymphoid elements of the mucous membrane.

5. The acute ulcer that is due to any of the many causes may be prevented from healing by the development of submucous œdema, and the chronicity maintained. On all the grounds above stated, one finds that it is more the submucous and the muscular layers that are involved in vitamin-B deficiency and hence the greater chance for the chronicity to be maintained once the acute ulcer or erosion is formed.

Probably, one is justified in stating on experimental evidence that the chronicity of the ulcers seems to be related to the duration rather than the degree of deficiency (Dalldorf and Kellog, 1932).

Thus, in conclusion, I think one is justified in stating that diet, specially vitamin-B deficiency in the diet, plays a definite rôle in the causation of this disease in India, if not in its onset (Rehfuss, 1927), certainly in its chronicity.

Discussion

Dr. Napier opened the discussion by questioning the validity of the observation regarding rapid emptying of the stomach in cases from South India : he noted that the acid curve terminated at 1½ hours, by which time the stomach would not usually be empty. He was also of the opinion that if statistics from medical wards were taken, a greater incidence would be shown in Calcutta, as was his experience in the Tropical Diseases Hospital.

Dr. Rao replied, 'the type of meal used in gastric analysis being the carbohydrate meal, the absence of the starch reaction to iodine gives definite evidence of the emptying of the stomach, unlike the alcohol meal.

The statistics of the medical wards were not particularly included, as the medical statistics are not so definite as the surgical statistics, because many allied conditions may be diagnosed as peptic ulcer, but the diagnosis on the operation table constitutes the correct diagnostic evidence in the surgical statistics'.

Dr. Sankaran questioned the rationale of including the disease of peptic ulcer as pre-eminently nutritional, or even as under the scope of a public health worker.

Dr. Krishnan argued that the evidence was piling up to show that diet plays a definite rôle in the disease.

Dr. G. Panja argued that if vitamin-B deficiency was responsible for ulcer formation in the stomach, it may also be responsible for the ulcer formation in the intestines as well. He further argued that if vitamin-B deficiency gave rise to ulcers, adequate vitamin-B therapy should heal up the ulcer.

Dr. Rao replied 'as peptic ulcer cannot form in the absence of hydrochloric acid, except rarely as in tuberculous ulcers, any dietetic factors that are responsible for ulcer formation in the stomach or duodenum cannot give rise to ulcers in the intestine, where the hydrochloric acid is neutralized and hence non-ulcerous conditions only can be encountered in the intestines.

In fact, the Continental and American workers are including vitamin B and vitamin C as a routine in the dietetic treatment only on presumption; but how far it is useful as a therapeutic agent cannot be vouchsafed at present'.

Dr. Ghosh argued that hypo-proteinæmia and vitamin deficiency cannot be factors on the ground that in other countries, where the ulcer

is equally as common as in India, the same deficiency does not exist.

Dr. Rao : 'It is only suggested that these factors in the diet may play an important part in the ætiology of the disease in India, just as other factors like alcoholic gastritis, nervous factors, and hyper-proteinæmia may be held responsible in other countries'.

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Medical News

SUMMARY OF TUBERCULOSIS NEWS FOR THE MONTH OF JANUARY 1939

HER EXCELLENCY LADY LINLITHGOW laid the foundation-stone of a new tuberculosis hospital at Nagercoil in Travancore State on the 11th January, 1939.

Lady Marjorie Erskine opened the new Linlithgow Ward in the Government Tuberculosis Hospital, Tambaram (Madras), on the 17th December, 1938.

Lady Brabourne performed the opening ceremony of the 'Shibkumari Chetlangia Cottages' in the Judabpur Hospital, Calcutta, on the 9th January, 1939.

The first course for the training of tuberculosis health visitors under the King George Thanksgiving Fund started at Delhi on the 16th January. Ten matriculate girls from different Provinces and States in India have been chosen for a six months' course at the Silver Jubilee Tuberculosis Hospital and the Lady Reading Health School, Delhi.

NATIONAL INSTITUTE OF SCIENCES OF INDIA

BREVET-COLONEL R. N. CHOPRA, C.I.E., K.H.P., M.D., S.D. (Cantab.), F.R.C.P. (Lond.), I.M.S., has been elected President for the year 1939.

UNRELIABLE ANTI-TOXIC SERA

THAT reliance on anti-toxic sera sold in India in open market might well entail the serious risk to the life of a patient is revealed by the fact that, as in the case of the many pharmaceutical preparations recently tested, anti-toxic sera, too, purchased in the open market, have been found to be much below the indicated strength, while on occasions they are even wanting in anti-toxic action.

This shows once again how very necessary the control of drugs, especially of those whose potency has to be relied on for treatment of emergent conditions, is in the case of therapeutic and prophylactic sera, which are the only powerful weapons available for the treatment of diphtheria, tetanus and other serious bacterial infections.

In England and many other western countries, sale of no anti-toxic sera, either manufactured locally or imported, is allowed unless each batch is submitted for testing by a control laboratory established for that purpose. The tests carried out include not only the estimation of the number of 'International Units' which each serum contains, but also the sterility and innocuousness of the product.

Certain specified institutes, such as the State Serum Institute, Copenhagen, and the National Institute for Medical Research, Hampstead, maintain standard serum preparations which are identical and issue these at six-monthly intervals to testing and manufacturers' laboratories. Their use for comparison of potency of sera enables the unitage of products to be specified in an exact manner.

The potency of anti-toxic sera can be measured by biological methods, with a high degree of accuracy.

International standards for the different sera in use have been established by the Biological Standardization Committee of the League of Nations, and these enable the exact strength of any serum to be determined. Methods have been worked out by which tests can be made against the 'International Standards' and the medical practitioner using a serum which has passed an official test and is declared to contain a specified number of anti-toxin units, can rely on the potency of the serum and also administer a correct dose.

XV ALL-INDIA MEDICAL CONFERENCE

RESOLUTIONS

THE following were amongst the resolutions passed at this conference:—

The conference requests the provincial governments to formulate National Health Insurance schemes in their respective provinces and urges them to appoint special committees to formulate schemes suitable to their needs.

In view of the fact that in future wars are not going to be confined to the fighting forces alone but would affect the civil population as well, this conference requests the provincial governments to institute a survey of all the available medical resources in their respective provinces which can be requisitioned at short notice to give relief to the civil population in cases of emergency arising out of air raids and other eventualities and to give facilities to medical practitioners to obtain necessary training in this regard.

This conference is of opinion that in every province of India either the Minister in charge of the Medical Portfolio or the Parliamentary Secretary should be a member of the medical profession.

In view of the fact that facilities for medical relief and measures for the prevention of diseases existing in this country at present, particularly in rural areas, are wholly inadequate, this conference is of opinion that the same should be improved—

- (a) by subsidizing medical practitioners possessing registrable qualifications to settle down in rural areas;
- (b) by establishing dispensaries in such places; and
- (c) by better equipping the existing hospitals.

That in the opinion of this conference all teaching medical institutions should provide facilities for research, and while requesting Government to institute research fellowships for the purpose, is further of opinion that facilities for research should also be provided in these institutions to such members of the independent medical profession as may desire to avail of the same.

This conference, while appreciating the efforts which are being made in various provinces to put the teaching and the practice of the indigenous systems of medicine on a sound footing, is of opinion that no person intending to practise these systems should be allowed State-recognition unless he passes after a preliminary general education, not below the standard of matriculation examination of Indian universities, through a course of training and instruction given by competent teachers in recognized institutions—

- (a) in the fundamental sciences (*viz.*, chemistry, physics, biology, physiology, anatomy and pathology);
- (b) in Ayurvedic or Unani medicine, elementary surgery, obstetrics and preventive medicine;

and passes an examination in the subjects of the curriculum to be conducted by Statutory Boards to be created on the lines of the Bombay Medical Practitioners' Act, 1938.

In view of the rapid increase in the incidence of pulmonary tuberculosis in this country this conference, while welcoming the initiative taken by Her Excellency the Marchioness of Linlithgow in giving impetus to raise anti-tuberculosis funds, strongly urges upon the Central and Provincial Governments, local bodies and

the public to take energetic measures for the prevention and treatment of this disease—

- (i) by taking steps to improve the nourishment of the people and increase their resistance to the disease;
- (ii) by propaganda and other methods to educate the people on the causes and prevention of the disease;
- (iii) by providing funds for research on tuberculosis;
- (iv) by instituting tuberculosis clinics at the teaching hospitals as well as in all districts and other towns;
- (v) by increasing accommodation in the hospitals and sanatoria for tuberculosis patients and providing domiciliary treatment;
- (vi) by establishing preventoria for children exposed to infection, and after-care colonies for patients suffering from chronic tuberculosis and
- (vii) by collaboration of the various local committees with the local branches of the Indian Medical Association in promoting anti-tuberculosis schemes.

This conference is of opinion that in view of the unanimous decision of the Delhi conference on Medical Education in India held on 7th November, 1938, this conference requests the provincial governments—

- (i) to take early steps to establish a uniform minimum standard of medical education in their respective provinces, the standard being that of university degrees, and
- (ii) to abolish all examining bodies, other than the universities, which may be granting medical diplomas and licences.

This conference requests the Central and Provincial Governments to pass Acts—

- (a) prohibiting the publication of obscene literature and advertisements advocating the claims of the efficacy of various drugs and appliances;
- (b) controlling and regulating the public advertisements of patent and proprietary medicines;
- (c) requiring the printing on the labels of patent medicines, the names of their manufacturers, their composition, and the date and country of manufacture; and
- (d) prohibiting the publication of the description of their properties and indications for use excepting in the medical press.

This conference welcomes the appointment of the National Planning Committee by the Working Committee of the Indian National Congress and recommends that it should include schemes for the manufacture of drugs and medical appliances in India for the requirements of the country amongst the items of its deliberations.

This conference notes with concern the increasing evil of quackery in the country and the use by unqualified persons of various designations and letters simulating recognized medical degrees or diplomas and requests the Central and Provincial Governments to take necessary measures to protect the public and the profession from the consequences of this evil.

This conference urges upon Government the necessity of making it a penal offence for anyone to use the prefix 'Doctor' or 'Dr.' before his name unless he possesses a degree of doctorate from any recognized university or possesses a medical qualification from one of the medical institutions recognized by the Indian Medical Council or a Provincial Medical Council.

Whereas in the interest of public health it is highly desirable to ensure uniformity of composition in the case of biological products such as sera, vaccines of organo-metallic and other special and proprietary medicines, and whereas it is necessary to provide a check on the extravagant claims put forward on behalf of patent medicines, it is resolved that the Central and Provincial Governments be requested to start, at a very early date, a central analytical laboratory and a provincial laboratory in each province to test such preparations from time to time and to report to

Government all cases where the medicines are found to be below the standard or the advertised specifications, for taking proper action.

Speech by Dr. Bhupal Singh, B.A., M.B., Chairman, Reception Committee.

HON'BLE MRS. PANDIT, MR. PRESIDENT, LADIES AND GENTLEMEN,

I consider it a privilege to welcome you, on behalf of the Reception Committee of the 15th All-India Medical Conference, to our small town of Meerut. The place is small, no doubt, when we compare it with the large towns like Calcutta, Bombay, Karachi, Madras, etc., which have had the honour of holding the conference in past years, but I can assure you that it is second to none in the warmth of welcome which it extends.

We are thankful to you all for having taken so much trouble, at such great sacrifice of your valuable time, to come to attend the conference—particularly so to the Hon'ble Mrs. Pandit, our Minister of Health, who has very kindly accepted our invitation to come and inaugurate our conference in spite of the great strain it will mean to her in her present state of health. This is a measure of the great interest she takes in matters medical and in the Indian Medical Association under whose auspices this conference is being held. You will all be delighted to know that she has recently given recognition to the U. P. Provincial Branch of the I. M. A. as an advisory body to be consulted by the Government in all matters connected with Medical Aid and Public Health. We cannot be too thankful to the Hon'ble Mrs. Pandit for this honour. I do hope the Governments in the other Provinces will follow the example and the Indian Medical Association, which is the only body representative of all classes of Medical men in India, will soon be the one authorized advisory body to the Government in the whole of India and I have no doubt the Indian Medical Association will prove itself worthy of the trust placed in it.

Ladies and gentlemen, we are passing through very important times in the history of the medical profession in India when, on account of the establishment of popular Governments in the Provinces and consequent change of the angle of their vision, changes of a very far-reaching nature are imminent regarding various medical problems such as:—

(a) *Medical education.*—We all know that the Hon'ble Dr. Rajan, the Minister of Health, Madras, has been the first to initiate reform in the system of medical education. He has, with a bold stroke of the pen, abolished medical school education in the Madras Presidency and has introduced one uniform minimum standard of medical education—the M.B., B.S. degree of the Madras University—converting a few of the medical schools into colleges preparing for it. This has removed the pernicious class system in the medical profession and has laid the foundation of perfect harmony which is bound to result in more efficient service. Let us hope this necessary reform will soon be introduced in the other Provinces. There is a universal demand for it by the profession, particularly by our licentiate brethren. In the United Provinces, the Hon'ble Mrs. Pandit has already appointed a committee to consider the question, which will be meeting soon. I have no doubt that this committee will come to the only conclusion that this reform is long overdue. Let us hope we will soon have in the U. P. another fully-equipped college at Agra preparing for the M.B., B.S. degree.

Facilities for post-graduate teaching and medical research are very meagre indeed and it is high time that adequate provision was made in connection with the teaching institutions.

(b) Another problem compelling consideration is that of *provision for suitable medical aid and health conditions for the rural areas*. It is admitted on all hands that the rural areas have been badly neglected up till now as far as medical aid goes and the rural

population is at the sweet mercy of diseases which are certainly curable if attended to in early stages. It is quite natural that the popular governments in the provinces are seriously turning their attention to this problem. The Indian Medical Association would be quite prepared to put its services as regards expert advice and men at the disposal of the provincial governments in tackling this very important problem. In this connection, I may inform you that the U. P. Provincial Branch of the I. M. A. has already submitted a memorandum to the Hon'ble Minister of Health, which is being considered by the U. P. Government.

(c) Yet another problem which we cannot ignore is that of the so-called indigenous systems of medicine—the *Ayurvedic* and the *Unani*. These systems are working side by side with the modern scientific system for the relief of human suffering. It will be absurd to belittle the services rendered by these ancient systems specially in the rural areas, where, perhaps, the only medical aid available has been through these systems. But it has to be admitted that these systems, for want of state patronage, have not only not progressed beyond a certain stage but have actually deteriorated and have not been able to keep abreast of the scientific discoveries made in the world around us. I am quite convinced that if they have the necessary support and encouragement these systems would have progressed on the same lines as the modern scientific system and then there would have been no difference of kind between the so-called indigenous systems and the modern system. There is a universal desire to modernize these systems and naturally much is being taken from the modern scientific system for the purpose—for instance the basic sciences like anatomy, physiology, etc. I would strongly urge the necessity of maintaining proper standards as there is a tendency to give a mere smattering of knowledge of these subjects. A Bill has recently been published by the U. P. Government—called the U. P. Indian Medicine Bill—which provides for a development of the Indian system of medicine and to regulate the practice thereof. This is a move in the right direction and will, I hope, help to set up proper standards by controlling educational institutions of these systems of medicine.

(d) Another point, which I would like to invite your attention to, is the report in the Press that the U. P. Government are thinking of entertaining German Medical Experts. This has, quite naturally, caused uneasiness in the minds of medical men in India. The only fair principle which should be followed in making such appointments should be to give preference to Indian, or, if no qualified Indians are available, to German doctors of the Jewish race in their cruel persecution but at the same time we must be fair to those Indians who are highly qualified—many of whom have had higher qualifications in foreign countries at huge expense, in various branches of medical science. I do hope the report in the Press is misleading and that the U. P. Government have no such intention.

Ladies and gentlemen, there are so many other problems confronting the medical profession, such as unemployment among medical men, control of drug manufacture and the I. M. S. and the autonomous Provinces, etc., which have to be considered by the conference, but I think I should not take more of your time as I am sure you must be anxious to hear our President. But before I conclude I would like to draw your attention to one more point. In conferences of this sort, much stress is, as a rule, laid on the rights and privileges of the profession. Let us make a new departure in Meerut this year and devote, in our deliberations, an equally serious attention to the duties and responsibilities of the profession as an important unit of the body politic. Let us take our cue from the British Medical Association and organize ourselves into a really living Indian Medical Association wholly devoted to the service of humanity at large and our unfortunate country in particular.

NEW HOSPITAL IN BOMBAY

'The Singhanee Hindu Hospital will be a very valuable addition to the many medical institutions provided by the philanthropy of Bombay citizens, of which we are justly proud', declared the Hon'ble Mr. B. G. Kher, Premier of Bombay, in opening the city's newest hospital at Grant Road, Bombay, on Tuesday evening.

The hospital and its annexures form a pleasant cluster of low buildings in a spacious compound. Though placed in a busy quarter in the heart of the city, an atmosphere of peace and quiet prevails within.

Dr. R. Row, Honorary Secretary to the Advisory Board, outlining the history of the hospital, said the late Mr. Pooranmull Gooljee Singhanee, who died in December 1928, after providing for some specific payments and a donation of Rs. 8,00,000 to Bombay University, left the entire residue of his movable and immovable properties for founding, maintaining and conducting a hospital for Hindus in Bombay. The bulk of the estate consisted of immovable properties which had been disposed of gradually; even now there remained a few awaiting sale. By judicious sales, a sum amounting to Rs. 25,00,000 was made to be available for the hospital, and the trustees felt that a beginning might be made to fulfil the wishes of the testator.

Dr. Row was requested by the late Mr. F. E. Dinshaw, one of the original executors and trustees, early in 1931 to study the problem and work out a scheme. It was realized that with the sum available it would not be possible to launch an ambitious scheme of a general hospital, but a modest start might be made embracing only one or two units, such as medicine and requisite surgery with an adequate out-patient department.

SPECIAL FEATURE

After visits to institutions in Calcutta and Europe, Dr. Row said that a scheme based on the model of the Hospital of the London School of Tropical Medicine and the Carmichael Hospital of the Tropical School in Calcutta was recommended. The special feature of these hospitals was that excellent work was turned out not only by way of medical relief, but also by way of additions and advances in knowledge of the many obscure conditions and treatment of disease, a result which on closer examination was found attributable to an intimate co-ordination obtaining in the organization of the institutions between the clinical observations and pathological investigations. The scheme submitted had, therefore, for its aim a more intimate association between these two functions than was usually to be found in large general hospitals or teaching institutions.

The scheme appealed strongly to the trustees, specially as they felt that it would, whilst carrying out the donor's wishes, form the nucleus of a future institution for advanced post-graduate studies in Indian tropical diseases, studies for which Indians had to travel to London or Liverpool. Efforts then made to secure accommodation from Government on suitable terms ended in failure, and owing to the death of Mr. F. E. Dinshaw in 1936, nothing could be done till March that year. The present site of the hospital was later acquired and possession obtained in March 1937. An Advisory Board representative of all sections of the Hindu community, of which Sir Purshotamdas Thakurdas is Chairman, was formed between 1936 and 1937. Building work was started in May 1937, and completed in October last.

The hospital, Dr. Row stated, consists of a fully equipped in-patients and out-patients department, a surgical department with an operation theatre and accessories, an X-ray department with up-to-date plant, a fairly complete laboratory for pathological investigation in conjunction with the clinical unit, an up-to-date mortuary, quarters, and a few cubicles for those who might not like to remain in the general wards and were prepared to pay for residence. The hospital has accommodation and equipment for 75 beds,

but for the present, he added, it was proposed to start with and maintain 30 to 35 beds.

Sir Purshotamdas Thakurdas said that the late Mr. Pooranmull Singhanee had been a prominent figure in the commercial life of Bombay coming from a family that was pre-eminently a commercial family. Hindus, and particularly Hindus with religious frame of mind, often left fortunes for building temples or feeding Brahmins, but Mr. Pooranmull left all his money to the trustees and no particular intention in which way it was to be spent.

The late Mr. F. E. Dinshaw, Sir Purshotamdas said, resolved upon spending some portion of the funds on technical education and a sum of Rs. 8,00,000 was earmarked for this purpose. A sum of about Rs. 20,00,000 was earmarked for the hospital, the whole conception and lines on which it was to be run having been mapped out by Dr. Row. A sum of money was set aside for the widow of the late Mr. Pooranmull, but when the whole estate was cleared, Sir Purshotamdas said, charity will benefit from it to the extent of about Rs. 35,00,000.

HIGHER TRAINING

The Prime Minister said it was a great pleasure to him to declare open the magnificent institution built and endowed by the munificence of the late Mr. P. G. Singhanee.

He congratulated the trustees of Mr. Singhanee's will, particularly Dr. Row, on having worked out a scheme which provided not merely medical relief, but also ample facilities for research in tropical and other diseases. The hospital would stand not only as a monument to Mr. Singhanee, but also to the far-seeing vision of those who conceived the idea of catering for a vitally important need of the growing generation of the medical profession. He hoped it would afford great facilities for young Indian doctors, who have to travel to England and other foreign countries to obtain the necessary higher training.

Calcutta, the Premier stated, owed its School of Tropical Medicine to the efforts of Sir Leonard Rogers; Bombay can now proudly associate Dr. Row's name with this fine institution.

It was his sincere hope that, in time to come, the benefit of the research work done at the institution would slowly permeate to the rural centres, where the solutions of the problems connected with health were complicated by the evils of ignorance, poverty and a low standard of life. Several diseases had recently been the subject of investigation in India, but there still remained a vast field to be explored. Treatment and prevention as applied to medicine were inseparable and the rural doctor, whether he is the subsidized or stipendiary practitioner conducting a rural dispensary, would play an important part in educating the public. As Government progress in their various schemes of rural reconstruction and medical relief, whether by providing subsidy or by encouraging indigenous systems of medicine, there would be ample room for the use of the knowledge acquired in the Singhanee hospital for relieving the suffering of humanity, being made available to all the people of the Province.—*Times of India*, 11th January, 1939.

INTERNATIONAL LIFE INSURANCE MEDICAL CONGRESS

THE next International Life Insurance Medical Congress will be held in Paris from 18th to 21st May, 1939, with Dr. P. Hornig, Berlin, Professor Sir Walter Langdon-Brown, London, as honorary presidents, and Professor M. Loeper, Paris, as chairman.

The following reports will be submitted and discussed:—

1. Consumption and life insurance.
2. Hyperthyroidism in life insurance.
3. The influence of obesity in life insurance.
4. The importance of tobaccoism in life insurance and in preventive medicine.

5. Albuminuria in life insurance.

6. The value of statistics in life insurance.

Those who wish to attend this Congress should inform Dr. P. A. Carrie, 8, Rue de Belloy, Paris (XVII).

The contribution for the members of the Congress is fixed at Frs. 200.

The contribution for persons accompanying the members of the Congress (one person for each member) is fixed at Frs. 100.

These contributions will give the right to the banquet, the evening parties and to the excursions for which the programme will be sent at a later date, and for the member of the Congress, to an account of the Congress (reports, discussions, communications).

THIRD ALL-INDIA OBSTETRIC AND GYNÆCOLOGICAL CONGRESS

THE Third All-India Obstetrical and Gynaecological Congress will be held in Calcutta during December 1939. The exact date will be notified later.

The chief subjects selected for discussion are:—

- (1) Functional uterine hæmorrhage.
- (2) Anæmia of pregnancy.
- (3) Maternity and child welfare.

Further information can be obtained from the Secretary, Bengal Obstetric and Gynaecological Society, c/o Calcutta Medical Club, 91b, Chittaranjan Avenue, Calcutta.

CENTENARY OF THE MEDICAL PRESS AND CIRCULAR

THE *Medical Press and Circular* was founded in Dublin by Dr. Arthur Jacob in January 1839 under the title of the *Dublin Medical Press*. At the time of its foundation the profession was entirely unorganized and Dr. Jacob was one of the first men to see the need for organization.

To mark its Centenary Dr. Robert J. Rowlette, who was for many years Irish editor, has written a most interesting history of the journal and its development and has woven into his account the medical history of the times.

Up to 1866 the *Medical Press* was published in Dublin but in that year it absorbed the *Medical Circular*, which was a London periodical founded in 1852 by Dr. James Yeaesley, the aural surgeon who was closely associated with the foundation of the Metropolitan Ear, Nose and Throat Hospital, and Dr. George Ross who edited the paper throughout the fourteen years of its existence. The *Medical Circular* had an eventful and successful career and in its early day carried on a more or less continuous warfare with Wakley of the *Lancet*. It also published a long series of illustrated biographies, some very adulatory and others much the reverse.

Arthur Jacob was a prominent man in Dublin, both in his speciality, that of ophthalmic surgeon, in which he carried out much research; as a teacher in the Royal College of Surgeons in Ireland, where he held the Chair of Anatomy and Physiology for 41 years; and in the medico-political sphere. His name and work were associated with rodent ulcer of the eye which for a long time was called 'Jacob's Ulcer' and also with the discovery of 'the layer of rods and cones in the retina' which was for many years described as 'Jacob's Membrane'.

He was a member of the Council and twice President of the Royal College of Surgeons in Ireland and on his retirement was presented by the College with a 'piece of plate of a value of not less than one hundred guineas' and his portrait, which was painted by Catterson Smith, R.H.A., and now hangs in the Great Hall of the College.

During its Dublin days and especially during the editorship of Dr. Archibald Jacob who succeeded his father, the journal took a very close interest in the betterment of the position of the medical profession

in Government employ under the Poor Law system 'Dispensary doctors' as they were called, and also in the development of the organization of the profession which was perhaps the most outstanding feature of the times. The 'General Medical Council' and State registration did not come about until 1858 and in the various proposals to Parliament which led up to the Act of 1858 the *Medical Press* played a leading part.

Both the Jacobs were very ardent reformers and took an active interest in every movement which aimed at the betterment of the profession, and both in its earlier and later years the journal maintained a constant warfare against quackery and unprofessional conduct, particularly of those in high places. As might be expected this brought it at times into difficulties but only once was it taken into the courts and on that occasion its costs were defrayed by public subscription.

In the nineties in common with other papers it pressed for reforms in the Army Medical Service, which removed many of the injustices and grievances under which officers formerly laboured.

Though medical politics played a large part in the editorial policy of the *Medical Press and Circular* throughout its career, it was far from being its major interest. In its early days it was very catholic in its contents and Dr. Rowlette records that it reported in its early volumes the proceedings (among others) of the Royal Society of London, the Zoological Society of London, the Royal Irish Academy and the Academy of Sciences of Berlin. As time went on the scope was narrowed down to medicine and a high standard of original communications has always been maintained.

In recent years especially the *Medical Press and Circular* has pursued an editorial policy of providing in concise and authoritative articles the latest accepted methods of diagnosis and treatment, and has continued to occupy a useful and influential place among current medical periodical literature.

Dr. Rowlette's 'History' is very artistically produced. It is illustrated with ten plates, which include portraits of the early editors. It is a tribute worthy of the great occasion, the centenary of what is to-day one of the practitioner's most useful journals.

LIVERPOOL SCHOOL OF TROPICAL MEDICINE. MARY KINGSLEY MEDAL

At a reception held on the occasion of the presentation of the Mary Kingsley Medal at the Liverpool School of Tropical Medicine on 23rd November, 1938, the Chairman welcomed the guests.

This is the second time, he said, that I have been privileged, on behalf of the council, to present these medals which are the highest distinction which the school can bestow.

On the last occasion in 1934, I had the honour of reading a message from H. R. H. the Duke of York, who was then our President. After ascending the throne, our former President honoured the school by graciously accepting the office of Patron. At the Annual Meeting this afternoon, a telegram of loyal wishes and dutiful appreciation was sent to the King and the following gracious reply has been received:

I sincerely thank the council and friends of the Liverpool School of Tropical Medicine for their kind and loyal message. As Patron, I am glad to know of the presentations of medals which are being made this evening and assure you of my continued interest in the work of the school'.—GEORGE R. I.

I am sure that all associated with the school are gratified to have this token of His Majesty's continuing interest in its work.

When the office of President became vacant, as I told the Annual Meeting this afternoon, there seemed to be only one person who could be first asked to fill it—Lord Derby—and he most kindly consented to do so.

The Mary Kingsley Medal was founded in 1904 to commemorate the work of Mary Kingsley, whose father was Charles Kingsley the novelist, in promoting the welfare of the natives of West Africa. Mary Kingsley

had personal associations with Liverpool, so it is most appropriate that this distinction should be linked with her name. The qualification for a recipient of the medal are services in the cause of preventing and fighting disease in the tropics. There have been many distinguished recipients in the past and the standard is well maintained by those whom we are honouring to-night. When introducing them, Professor Warrington Yorke will speak with more authority and in greater detail about their scientific qualifications than I can, but I would like to suggest that their acceptance of this honour is yet another example of the international character of all true science. Dr. M. A. Barber is at present working in Mexico and so unfortunately cannot receive the award in person. In Emeritus Professor Patton we have one who was a Professor here for ten years and a distinguished British entomologist, while Professor Brumpt comes from Paris and Professor Schulemann from the University of Bonn in Germany. Finally there is the award which I feel sure will give the greatest possible pleasure to her friends in this neighbourhood, the one to Lady Danson, whose husband was Chairman of the school and one of its founders. It has become customary, when awarding these medals, from time to time to step outside the ranks of scientific workers and honour the names of those who, although not technologists, will always remain associated with the progress of Tropical Medicine. We have the happiest memories of the late Sir Francis Danson, whose son is a member of our council, and I am sure you will agree that Lady Danson is a most fitting recipient of a Mary Kingsley Medal.

A little while ago, I happened to see a performance of a one-act play by Neil Grant in which one of the characters is a microbe. The play is called 'The Last War' and suggests that, in the final Armageddon, when the warring nations are busy cancelling each other out, after bullet, shell, bomb and gas have done their worst, the entomologist will be harnessed to a chariot of war and the parasitologist will put on the armour of Mars in order to complete the holocaust. The play depicts a group of animals discussing the situation after the last specimen of *Homo sapiens* has been wiped out. Actually in the play one soldier escapes, but that is by the way. The play gives rise to some awesome thoughts, for one certainly feels that, however much scientists in other fields may turn their attention to new means of destruction, medicine in general and tropical medicine in particular will always be devoted to the saving of life only.

It is an interesting thesis, but meanwhile the school continues on its beneficent way. I can hardly believe that Professor Warrington Yorke, even if he were willing to try, could call a halt to his long campaign against the bacillus, and persuade it to be his ally instead of his enemy, or that Professor Gordon, even with all the resources of the Insectarium, could raise a race of microbes which would obligingly take sides in a world war. Forgive this digression.

Before calling upon Professor Warrington Yorke, I would like to call your attention to two significant anniversaries. This year marks the fortieth anniversary of the founding of this school and it is just half a century ago that the late Sir Ronald Ross made the great discovery of the transmission of malaria by the mosquito. To realize what that means, we have to try to imagine what the tropics would be to-day if the discovery had never been made; what life there would be like if, although doctors might know how to treat and cure malaria, they had no idea how it arose and no knowledge of what sanitary precautions had to be taken to prevent it. It was an epoch-making discovery and this school can be proud to recall that Ross became a member of the original staff here and accompanied a succession of expeditions sent by the school to various tropical regions.

LADY DANSON

The first Mary Kingsley Medalist on this occasion is a lady distinguished in many ways and well known to us all. By this award we convey our appreciation of the part which she has taken, and is still taking

in promoting the investigation of tropical diseases, thus furthering the endeavour of her late husband.

The association of Sir Francis Danson with this institution began very early in its history. As you have heard, the school was founded in the year 1898; and already, in 1901, we discover Mr. Danson representing the Council of the University on the school committee. In 1908 he attained the office of vice-chairman, and in 1913 he succeeded the late Lord Leverhulme as Chairman of the School, a post which he continued to hold until his death in 1926.

It was during his lengthy period of office as Chairman that he saw the establishment of the school's research laboratory at Freetown in Sierra Leone, West Africa, for the construction of which a sum of £10,000 had been bequeathed by the founder of the school.

Sir Francis Danson took a deep interest in the opening of this West African laboratory, and, while he fully recognized the strain which this scheme must throw upon the limited financial resources of the school, he felt so optimistic about the prospects of research there that he urged the professional staff and committee to risk the venture, leaving for the future the question of adequate endowment of the laboratory. From the scientific point of view his optimism has been justified. The Sir Alfred Lewis Jones Laboratory in Freetown is an institution which has made valuable contributions towards the solution of many problems of tropical disease.

In the year 1920 Mr. Danson's services to this school and to other public bodies in Liverpool were rewarded by the conferment of a knighthood. How great a part he played in the life of Liverpool could only be gauged from a full recital of the number of important offices he held—a recital too long for an occasion such as this.

But Lady Danson was far from idle during all the years in which her husband presided over the destinies of the school. She was not content to be a passive spectator of its rapid development, but took the keenest interest in all its varied and sometimes disconcerting phases. On occasions, during her husband's enforced absence owing to sickness, she found herself suddenly called upon to assume, at public functions, the duties of Chairman. It was at such times that she revealed, somewhat to the surprise and greatly to the enlightenment of members of the committee and of the professional staff, not only that she had a thorough grasp of the affairs of the school, but also, incidentally, that she herself was no mean orator.

It is, therefore, no less on account of her own faith in the future of the school than in recognition of her late husband's long services to it that we have particular pleasure in awarding the Mary Kingsley Medal to Lady Danson.

MARSHALL ALBERT BARBER

Seventy years ago—to be precise, 70 years ago yesterday—Dr. Marshall Albert Barber was born at Crown Point, in India. I suppose that, like other children born in India, he was tormented by mosquitoes. If this be so, he has exacted a full revenge from these enemies of mankind, for during the past quarter of a century he has devoted himself to the study of their habits, and has added greatly to the knowledge of how best they may be destroyed.

Amongst his many contributions to this branch of science, there ranks foremost his discovery of the manner in which 'Paris green', an arsenic compound, can be used as an effective and inexpensive means of destroying the larvæ of malaria-carrying mosquitoes—a discovery which has benefited mankind in every part of the world where malaria afflicts the human race.

Dr. Barber's long and distinguished association with the International Health Division of the Rockefeller Foundation is well known, not only on account of his researches in malaria, but also for work on the hookworm. During his visit to the Orient in 1915-1917, Barber published papers on both these diseases, and showed clearly for the first time the part played by each in producing the anæmia which is so pronounced

a feature of the inhabitants living in districts where the diseases are endemic.

A man more versatile than most of his fellows, he has in his time laboured in many fields of science, for he was an Assistant in Botany at Harvard as long ago as 1892, and became Professor of Bacteriology and Pathology at Kansas at the early age of 26. It was during this period of his career that he invented the apparatus with which his name will always be associated, the 'Barber micro-manipulator'. This instrument, like so many great inventions, was simple in its original conception, but its introduction marked an important advance in medical science, for by its aid bacteriologists are now able to study the growth of individual minute organisms, and biologists to dissect individual cells, under far higher magnifications than were previously possible.

Dr. Barber has had an exceptionally long and distinguished scientific career. Thirty-five years ago he published his first important contribution to medical science, and to-day, at 70 years of age, he still continues, with that indefatigable zeal which is so characteristic of him, to add to the store of human knowledge by his studies of malaria in India and America.

We much regret that Dr. Barber, who is at present working in Mexico, is unable to be with us to-night; but we are pleased to welcome his distinguished colleague, Professor Gunn, vice-president of the Rockefeller Foundation, who has kindly consented to receive the medal for him.

EMILE BRUMPT

We honour next Professor Brumpt. Professor Emile Brumpt was born in Paris in the year 1877. He studied at the Sorbonne and in the Faculty of Medicine of Paris, and was awarded the degree of Doctor of Natural Sciences in 1901. He became a Doctor of Medicine in the year 1906, presenting a thesis on Mycetozoa. In 1907 he was appointed Associate Professor of Parasitology and Natural History in the Faculty of Medicine, and in 1919 he attained full professorial status.

It was in this year also that he was elected a member of the Academy of Medicine, and it was not long before he was being honoured by membership of numerous foreign scientific academies and societies. In the same year he undertook the heavy duties of Secretary-General of the Institute of Colonial Medicine of France, which he still carries out with energy. In the year 1926 he was appointed director of the School of Malariology of the University of Paris.

Professor Brumpt is the author of over 350 published papers, covering a wide field of scientific investigation. One of his outstanding contributions to the wider dissemination of knowledge of the subject of parasitology was his foundation of the *Annals of Human and Comparative Parasitology*, a journal which he has directed from its inception. His name is familiar to students in every country from the popularity which has been attained by his well-known textbook on parasitology, of which compendious tomes—there are two of them—the fifth edition has recently appeared.

Brumpt, the professor, the scientific and successful investigator into innumerable problems of tropical parasitology, is a name to conjure with in every centre where research in parasitology is in progress. Brumpt, the man, is certainly one of the most familiar medical figures in the world to-day. He has for many years been an indefatigable traveller, and the celerity of his meteoric excursions over the surface of the globe is something quite remarkable. No form of transit is too rapid for him. The directors of railway, shipping and airline companies must all bless the name of Brumpt—that is, of course, assuming that he is always a fare-paying passenger. If one wishes to discover Brumpt, one may look for him almost anywhere in the wide world with an equal chance of success. He may be in China or Peru, on the Amazon or the Euphrates; he may be sitting chilly on the rocky mountains or plunging in perspiring haste through the forests of equatorial Africa. Wherever he is found

he will always be the same alert, earnest investigator. He is the personification of the ardent spirit of research, filling each 'unforgiving minute with sixty seconds' worth of distance run'.

WALTER SCOTT PATTON

In honouring Professor Walter Scott Patton we are honouring a colleague who has worked for ten years with us in this school.

Patton was born in India in 1876, and, after obtaining his medical degree in Edinburgh and spending some time in postgraduate study in Germany, he joined the Indian Medical Service in 1902 and returned to the land of his birth. Here for twenty years he laboured, adding much to our knowledge of the diseases of that country. The Indian Medical Service contains the names of many who have achieved fame in science, and Patton's occupies a place of honour amongst them. The routine duties of an officer in the Indian Medical Service are manifold and arduous, yet, like his comrades Ross and Leishman, Patton always found time—the time that most men would have devoted to recreation—to pursue his investigations. The value of his work was early recognized by his appointment as a specialist to investigate the etiology of Kala-azar and Oriental sore, and later by his promotion to the Directorship of the King Institute of Preventive Medicine in Madras.

In 1921, he joined the staff of the University of Edinburgh. He was not, however, allowed to remain long in this academic sanctuary, for in 1925 the Royal Society organized the Kala-azar Commission to Northern China, and selected Patton to be its Director.

In 1927, Patton was appointed to the Dutton Memorial Chair of Entomology in this University. During the ten years which he has occupied this Chair his kindness and courtesy endeared him to all with whom he came in contact; and it was with the very deep regret of all his colleagues that it was learned in December last that he had been compelled to resign owing to ill health.

With a modesty rare in this self-seeking age, Patton has been content to work long and arduously, seeking only to help his fellow men. In this country, in India and elsewhere there are colleagues who owe much to their association with him, and scattered over the world there is an army of students whom he taught with that patient care and attention to detail which are characteristic of the man. But there is another and far greater army who, though they have never met him, know him through his books. They are formidable, imposing volumes, these Debretts of the entomological world, whose pages you examine with the comforting thought that if it is not in 'Patton' it is not worth while. Not, perhaps, books to be lightly read, but rather with the feeling that

'Here index learning turns the student pale
Yet holds the eel of science by the tail'.

We all regret that Professor Patton is unable to attend to-night to receive the medal in person. But he is represented by a colleague who has worked with him for 32 years—one who has rejoiced with him in his many successes and shared his few failures, and who has added much to the interest and scientific value of his numerous publications by those exquisite drawings which bear the well-known signature E. M. P. I refer, of course, to his wife, whose presence here to night gives us all great pleasure.

WERNER SCHULEMANN

Professor Werner Schulemann was born in Silesia in 1888, and was educated in the Universities of Freiberg and Breslau, where he studied chemistry and medicine. He gained his degree in science in 1913, and graduated in medicine the following year. After the War he joined the great German chemical firm of Bayer, and soon rose to the directorship of that firm's celebrated pharmacological laboratories at Elberfeld. There he devoted his remarkable gifts to the study of pharmacology; he synthesized new chemical compounds which are now widely used as local anaesthetics and soporifics and for a variety of other medicinal purposes. His

researches on the relationship between chemical constitution and pharmacological activity have received universal recognition.

Although Schulemann has never visited the tropics, his researches at Elberfeld have resulted in a discovery of such importance to tropical medicine that his name is known to all workers in this field.

In order that you may appreciate the full significance of Schulemann's work I must take you back to 1905, when the late Dr. Wolferstan Thomas of this school discovered that it was possible to cure animals infected experimentally with the sleeping sickness organisms by means of a practically unknown and unused proprietary substance called 'atoxyl'. This substance, which was soon shown to be a compound of arsenic and aniline, was immediately tried with striking success in cases of human sleeping sickness, which at that time was destroying hundreds of thousands of lives in Tropical Africa, and for which we had no remedy.

This empirical discovery—that it was possible to cure the fatal infection by a chemical compound manufactured in the laboratory—called forth Ehrlich's classical researches, which culminated a few years later in the production of salvarsan, or '606', as a cure for syphilis. The modern science of chemotherapy—the treatment of infectious diseases by chemical substances—was thus established on a sure foundation, and soon other compounds were prepared whereby many of the deadly diseases of the tropics can now be cured.

The problem of malaria—the greatest of all tropical diseases—still remained. Fortunately, we were far from unarmed in our warfare on this disease, because nature had provided a remarkable remedy in quinine. Nevertheless, the efforts of the chemist had failed to produce any drug which was of the slightest value in the treatment of malaria.

In 1924, Schulemann published a discovery of the greatest importance. He had succeeded in synthesizing in the laboratory a chemical compound which not only acted on the malaria parasite, but accomplished what quinine had failed to do, in that it destroyed the stage of the parasite which infects the mosquito. This outstanding achievement attracted world-wide attention and gave a great impetus to the comparatively new science of chemotherapy, the full significance of which is only now beginning to be appreciated.

Although Schulemann is the last of the distinguished scientists whom we are honouring to-night, he is certainly not the least. Beneath his formidable exterior is a genial and kindly nature which has made for him a host of friends in many countries. A man of wide interests and accomplishments, he touches life at many points. He speaks four languages fluently, and has a profound admiration for all that is beautiful: to visit the galleries of Rome under his guidance is a delight.

Two years ago Schulemann left the firm of Bayer to become Professor of Pharmacology at Bonn: he has the best wishes of all his friends in his endeavour to create at that ancient seat of learning a department worthy of the great subject which he adorns.

Current Topics

Anæmia and Disorders of the Blood

By L. E. H. WHITBY, C.V.O., M.D., F.R.C.P.

(From the *Practitioner*, Vol. CXLI, October 1938, p. 453)

THE erythron is a system, the activities of which are delicately balanced to meet the requirements of the rest of the body. Hence, disease in any place may give rise to changes in the circulating blood. Such changes may be acute, chronic, progressive, or perhaps so slight as only to be apparent in a series of observations. Much study has been devoted to establishing the blood findings of different diseases, but only rarely are such findings diagnostic. Furthermore, with

the striking exceptions of leukaemia and aplastic anaemia, almost all blood changes are signs of disease and not a disease *per se*. Like all other physical signs, blood changes are most easily recognized and assessed at the time when the patient first seeks advice, that is, before symptomatic treatment with haematinics or other drugs has obscured valuable haematological features. Every case of anaemia should suggest the question 'Why?' and this should be answered whenever possible, before treatment is begun.

Haematological examinations require time and a great deal of experience; frequently the preliminary investigation can be nothing more extensive than a simple blood count. If this does not provide conclusive information the more elaborate procedures of a trained haematologist are necessary. Certain tests, particularly those involving coagulation factors, require the attendance of the patient, but the majority of the important procedures in a blood examination can be performed on samples of blood measured in exact amount into tubes containing an exact amount of oxalate salts; such tubes, with instructions, are supplied by most laboratories. A modern blood examination does not stop short at an estimation of haemoglobin and red cells and a determination of colour-index: it seeks to analyse any anaemia that may be found in terms of red-cell size and haemoglobin concentration. These two factors, which are inseparately combined in the colour-index, must be separated into values known as the mean corpuscular volume (M.C.V.) and mean corpuscular haemoglobin concentration (M.C.H.C.). By so doing it will be found whether the size of the red cells is large, normal, or small, and whether the concentration of the haemoglobin in the cells is normal or low; it is not possible to have the haemoglobin concentration greater than normal because there is a physiological limit to haemoglobin saturation.

The anaemia may thereafter be classified into one of Wintrobe's four groups; these groups have been found to be of great practical value for clinical purposes. These groups are: (1) normocytic and normochromic; (2) simple microcytic; (3) hypochromic microcytic; (4) macrocytic. According to the group, it is possible to form some reasonable opinion as to the probable basic cause of the anaemia.

THE ANÆMIAS

The commonest anaemias of general practice are due to toxæmia or general debility and these anaemias are almost invariably either normocytic and normochromic or simple microcytic. The remedy is to find the cause rather than to provide a haematinic because haematinics have little effect on such anaemias. The causes occupy a wide range—a septic focus, such as a tooth or sinus, an unhealthy occupation, a non-physiological life, a chronic infection, a chronic toxæmia, or some more ominous reason such as tuberculosis, nephritis or a neoplasm. Aplastic anaemia, a rare disease, is normocytic and normochromic.

Hypochromic microcytic anaemias form most of the marked anaemias of general practice. The commonest cause is hæmorrhage and if this is from the bowel it may quite often pass unnoticed. Bleeding from the uterus, bleeding from piles and bleeding from alimentary ulcers, simple and malignant, always produces this type of anaemia. Hypochromic microcytic anaemia is found also in infantile iron-deficiency anaemias, in the idiopathic hypochromic anaemia of middle-aged women, and in Banti's syndrome.

Macrocytic anaemia comprises the pernicious type and is found in most characteristic form in true pernicious anaemia. But not all macrocytic anaemias are pernicious anaemia. A similar blood picture may be found in sprue, alimentary neoplasm, certain helminth infections, cirrhosis of the liver, and a number of intestinal disorders. Macrocytosis may also be present for a short period after an acute hæmorrhage, and in adults it is sometimes a prominent feature of hæmolytic anaemias associated with splenic enlargement which, in the present state of knowledge, are still classed as the adult or acquired form of acholuric jaundice.

With a simple blood count, a high colour-index inevitably indicates macrocytosis but the reverse is not necessarily the case; a low colour-index does not exclude macrocytosis. One other phenomenon of red cell size has to be borne in mind—the so-called 'spherocytosis' which is characteristic of acholuric jaundice. In this disease the cells appear microcytic in a stained film, but the mean corpuscular volume is relatively high because the cells are thicker than normal.

It is perhaps unfortunate that blood not more than three hours' old is required for a sedimentation test because this non-specific test is now known to be invaluable for differentiating functional from organic disease. Thus pernicious anaemia and idiopathic hypochromic anaemia, both due to stomach dysfunction, cause no increase in the sedimentation rate, whereas carcinoma of the stomach, which haematologically may closely resemble either of the two functional diseases, almost invariably increases the rate. When an anaemia is accompanied by an increased sedimentation rate it is important to look carefully for a source of sepsis (which itself may be the cause of the anaemia) or for some definite organic disease.

DETAILED INVESTIGATIONS

With the anaemia placed into its correct group, before the results can be properly assessed, the findings must be taken in conjunction with the clinical picture as well as with any other abnormalities that may be observed in the blood in the course of the routine examination. The advantage of the modern method of blood collection is that the haematologist has available a sufficiently large sample of blood with which to proceed to any investigations that are relevant. For example, supposing the blood film contains numerous polychromatic or punctate basophilic cells, it can be inferred that there is a reticulocytosis and the number of reticulocytes should be determined. Reticulocytosis is found after hæmorrhage, in acholuric jaundice, in chronic lead poisoning and chronic malaria. An estimation of bilirubinæmia, a platelet count or a fragility test (which nowadays is always performed by an exact quantitative method in order to detect minor degrees of increase in fragility), may also be indicated. The sedimentation test is performed as a routine. The leucocyte count, total and differential, is an integral part of the routine examination and may itself suggest possible causes for anaemia. The value of the leucocyte count in cases of pyrexia of unknown origin is well known; but it is perhaps not realized how essential is this simple examination with an ulcerating or hæmorrhagic lesion of a mucous membrane especially when in the mouth or pharynx. All such lesions must always raise the suspicion of agranulocytic angina or of leukaemia. Frank leukaemia is readily diagnosed from peripheral blood. The most difficult problem which confronts the haematologist is the differentiation of certain leukaemoid conditions from true leukaemia and especially when the last named presents the so-called aleukæmic blood picture. Aplastic anaemia and agranulocytic angina have also to be considered in differential diagnosis. When such illnesses are not quickly fatal it is much better that they should be investigated under hospital conditions where serial observations of the blood should provide the correct answer. Usually, however, it is necessary to examine more than the peripheral blood. Leukaemia and aplastic anaemia are primary diseases of the marrow and it is therefore essential to examine this tissue, either by sternal puncture or sternal trephine; the last named gives the more accurate picture. Quite often the state of the marrow, which is the key to the diagnosis, is not accurately reflected in the peripheral blood. Modern methods of study by supravital technique enable difficult primitive diagnostic cells to be identified. Leukaemia with its hopeless prognosis has to be most carefully distinguished from the benign infection known as glandular fever. To the experienced, glandular fever presents a characteristic blood picture, but the monocytic and lymphocytic cells which the infection produces are not infrequently mistaken

Reviews

KRANKHEITEN UND HYGIENE DER WARMEN

LANDER.—By Prof. Dr. P. Mühlens, Prof. Dr. E. Nauck, Doz. Dr. H. Vogel and Flottenarzt, Prof. Dr. H. Rugo. 1938. Published by Georg Thiemo/Vorlag/Lolpzig. Pp. 562. Illustrated with several coloured drawings and black and white illustrations. Price, RM. 43.

WITH the issue of the fourth edition, this book must now be moved up into the first rank of textbooks on tropical medicine. This is not said with any intention of disparaging the previous editions, but because they did not make any claim to be comprehensive, a claim to which this edition has the obvious right.

Professor Ruge still contributes a majority of the sections, with Professors Mühlens and Nauck as close seconds. Dr. Vogel has contributed the helminthological section, and Prof. E. Martini some of the purely entomological and the zoological sections.

The first section is logically a general one on tropical hygiene, and this is followed, not quite so logically, by a short section on the blood and blood technique.

The book is divided under a number of major headings, the first and most important of which is infectious diseases; in this is included protozoa, spirochaetes, virus diseases, Bartonella and Rickettsia. The 77 pages on malaria would have made a good monograph on malariology and a far more complete one than many that have been issued. Every aspect of the subject is dealt with comprehensively and there are numerous useful line drawings and half-tone figures showing methods of mosquito dissection and identification. Treatment has not unnaturally been given a most important place, in view of the great contribution that have come from German scientists on this subject, and recent drugs such as certuna are mentioned. Anti-mosquito methods of prophylaxis are described in some detail and again many illustrations are given.

It would be an interesting subject of psychological study as to why the malariologist cannot possibly oil a stretch of water or spray Paris green without having a photograph taken of himself doing it. On the whole, the illustrations in this book are relevant, an exception being the rather naive picture of how not to hang a mosquito net; a child of three would scarcely commit such a mistake.

The next two sections are on sleeping sickness and leishmaniasis, respectively; in each case the treatment of the subject is comprehensive, and, in fact the same can be said for each disease in this section.

The next major heading is dietetic diseases, which includes Bengal epidemic dropsy: in this section there is a reference to the work of Chopra and Mitarbeiter (*sic*), 1937, on tissue culture—this appears to be a curious misprint which is not characteristic of the book.

Then follow sections on bacterial diseases including tularemia and melioidosis (*sic*—the reviewer has accordingly revised his pronunciation of the word), helminthic and arthropodal diseases, and tropical skin diseases, in which section leprosy is included.

The last few sections are on fish and snakes, on miscellaneous subjects such as splenomegaly and tropical macrocytic anaemia, on tropical surgery, and on cosmopolitan diseases occurring in the tropics.

The worker in tropical countries will find the book an invaluable addition to his personal library and no medical institution library will be complete without it.

L. E. N.

THE BRITISH ENCYCLOPÆDIA OF MEDICAL PRACTICE INCLUDING MEDICINE, SURGERY, OBSTETRIC, GYNÆCOLOGY AND OTHER SPECIAL SUBJECTS. Under the General Editorship of Sir H. Rolleston, Bt., G.C.V.O., K.C.B., M.D., D.Sc., D.C.L., LL.D. 1938. Butterworth and Company, Limited, London. (To be completed in 12 volumes.) Sold in complete sets only. Cash price, Rs. 25 per volume. Also available on the instalment system at Rs. 10 per month. Price, Rs. 26-8 per volume. Only available from Messrs. Butterworth and Company (India), Limited, Calcutta. Volume VIII. Pp. xix, plus 664 plus 48 with 13 plates.

THE range of this volume is from leukaemia to mucous colitis. It is an important volume, as it includes comprehensive sections on diseases of two important organs, the liver and the lungs, and on that corner-stone disease of the tropics and sub-tropics—malaria.

The first chapter, on leukaemia, is contributed by that well-known haematologist, Dr. Janet Vaughan. As one would anticipate, she has made as comprehensive a survey of this important group of diseases as the space (40 pages) allowed. The chapter is enriched by a number of plates, three of which are in colour. The classification given is the generally-accepted one and the treatment of the subject is practical, concise, and orthodox. A note on the technique of sternum puncture is appropriately included here. There is much to be said for the suggestion that only 0.2 c.cm. of fluid be taken, but this does not allow sufficient for a satisfactory total nucleated-cell count of the material. In the table showing the normal findings, she places 'megablasts of Ehrlich' at 0 to 25 per cent. The authors who have given the normal range of megablasts as up to 25 per cent must be few, and we do not believe that anyone has described finding more than an occasional true Ehrlich's megablast in normal marrow. Her illustration of this cell is very poor.

Liver diseases are dealt with in eleven sections. The first is appropriately on liver function tests; this and the majority of the other sections are written by Dr. R. S. Aitken of the British Post-Graduate School, but the editor contributes the section on the blood vessels of the liver, Sir Leonard Rogers on tropical liver and Sir U. N. Brahmachari on infantile cirrhosis of the liver. Sir Leonard explains in two pages that there is no such condition as tropical liver, or alternately that it is amoebic hepatitis.

The diseases of the lung are similarly dealt with in a number of sections, abscess and gangrene, atelectasis and collapse, oedema, tuberculosis, syphilis, moniliasis, fibrosis, tumours, and post-operative complications. The chapter is not of course comprehensive and other diseases of the lungs, such as broncho-pneumonia, empyema, and pneumoconiosis have been, or will be, dealt with in other volumes. The most important is the section on tuberculosis by Dr. L. S. T. Burrell of the Royal Free and Brompton hospitals.

The chapter on lymphopathia venereum (lymphogranuloma inguinale) is an authoritative contribution by Dr. Hugh S. Stannus who has done much to disentangle the muddle over the different clinical syndromes brought about by the specific virus of this disease.

Sir Rickard Christophers who has done so much to forward the study of malaria in India has given a very valuable account of the disease from the parasitologist's point of view. It includes some good coloured plates and a useful summary of the present position regarding the treatment of malaria. The pathological section is, however, particularly disappointing, for example, the observation that the van den Bergh 'direct delayed' reaction is positive in malaria 'with the indirect reaction increased' as an unqualified statement is very misleading. The information on the blood picture is meagre and amounts to little more than the rough impressions of a parasitologist who was compelled whilst studying the morphological minutiae of the malarial parasite to include in the microscopic field certain

blood cells. One looks in vain for a histological picture of the spleen in either acute or chronic malaria.

A good account of that rare disease melioidosis is given by the late Dr. William Fletcher. Other important chapters are on meningitis by Dr. Letheby Tidy, on menorrhagia and metrorrhagia by Mr. Eardley Holland, and on mucous colic by Sir Arthur Hurst.

There is an excellent essay on metabolism by Dr. R. A. McCance which is followed by one on basal metabolism, its significance and the methods for measuring it, by Dr. Douglas Robertson.

Altogether the contributions in this volume are of a very high standard.

THE EXTRA PHARMACOPŒIA—MARTINDALE.

Twenty-First Edition in Two Volumes. Volume II. 1938. Published by direction of the Council of the Pharmaceutical Society of Great Britain. The Pharmaceutical Press, London (23, Bloomsbury Square, W.C.1.). Pp. xxxvi plus 1148. Price, 22s. 6d. Postage, 6d. extra

The story of the *Extra Pharmacopœia* is one of a 'rakes progress' and just shows what the writing of books may lead to. The first edition, published in 1883, was an innocent little volume of 313 pages; the 21st edition consists of two volumes of 1182 and 1118 pages, respectively.

With the publication of volume II, the new proprietors of this work have issued the first edition for which they were completely responsible. The Council of the Pharmaceutical Society of Great Britain took over the publication of this invaluable work after the death in 1933 of Dr. Martindale, whose father had been responsible for the first edition, and published volume II of the 20th edition, volume I having appeared in 1932.

The name, Martindale, still appears on the title page and cover and we hope it always will.

There is little change on the scope of this work, but knowledge has increased, so inevitably must it grow. The information, which is nearly all essential for the proper practice of both pharmacy and medicine, is reasonably up to date, that is to say, up to the end of 1937.

The sections on nutrition and vitamins contain concise information that should be particularly useful to the practitioner, also the sections on new ethical proprietary medicines and tests and microscopic methods for blood, urine, etc. The same might also be said of the 136 pages devoted to bacteriological and clinical notes. Again, the information given is usually up to date, but it is necessarily rather fragmentary. It is a section that will perhaps appeal more to pharmacists, for the average practitioner should have some more complete recent book of reference. Nevertheless, many will appreciate this additional source.

We cannot enumerate all the section headings in this short review, but they include a table of infectious diseases, chemotherapy, x-ray diagnosis, electrotherapy and diathermy, food preservatives, and milk and milk products.

This 'bible' of the pharmacist and analyst will prove an invaluable addition to any medical man's library.

A SYNOPSIS OF MEDICINE.—By Henry Letheby Tidy, M.A., M.D., B.Ch. (Oxon.), F.R.C.P. (Lond.). Seventh Edition. 1939. John Wright and Sons, Limited, Bristol. Pp. xix plus 1187. Price, 21s.

THERE are synopses and synopses—pure 'crum' stuff for examination purposes only, and comprehensive summaries for the practitioner as well as the student. This book certainly belongs to the latter class. Take the first subject, for example; 30 pages are devoted to typhoid. In these pages nothing seems to be redundant and little is missing.

In the present edition a large number of sections have been rewritten and nearly all others have been brought up to date. The tropical-disease sections are on the whole good, but perhaps not quite as up to date as the rest. There is, for example, no mention

of nicotinic acid in the treatment of pellagra, carbarsone in amoebiasis, or tetrachlorethylene in ankylostomiasis.

Dr. Letheby Tidy is responsible for many very valuable contributions to medical literature and this book takes a high place amongst them. It is certainly one of the best books of its kind in the English language (the last edition incidentally was translated into German) and the reviewer can strongly recommend it to both the student and the practising physician.

WHITLA'S DICTIONARY OF TREATMENT INCLUDING MEDICAL AND SURGICAL THERAPEUTICS.—By R. S. Allison, M.D., M.R.C.P. (Lond.), and C. A. Calvert, M.B., B.Ch., F.R.C.S.I. Eighth Edition. 1938. Baillière, Tindall and Cox, London. Pp. vii plus 1285. Price, 30s.

OWING to the death in 1933 of the distinguished author of this well-known work the production of the eighth edition has been taken over by two other Belfast practitioners. Recent advances have necessitated many alterations and the re-writing of the major portion of the contents. In this task the authors have not been content with doing the whole work themselves but have added to the number of special contributors and ten other names appear. All of them are Belfast men and in their hands the book has suffered no deterioration compared with the earlier editions, and it stands as a tribute to the high quality of medicine in Belfast city.

The sections dealing with tropical medicine have been well done by a worker who has had long practical experience of tropical medicine in Africa and the result is that it is free from the many errors so common in books on general medicine in which tropical diseases are included, and the information is also right up to date. Accordingly this valuable volume for ready reference can be recommended to tropical practitioners as well as to their colleagues of temperate climes.

CHRONIC DISEASES OF THE ABDOMEN: A DIAGNOSTIC SYSTEM.—By C. J. Marshall, M.S., M.D. (Lond.), F.R.C.S. (Eng.). 1938. Chapman and Hall Limited (11, Henrietta Street, W.C.2), London. Pp. xviii plus 247. Illustrated. Price, 25s.

THE 'chronic abdomen' is to the house physician what the 'acute abdomen' is to the house surgeon, his most difficult problem. He will certainly welcome this book, in which the subject is treated in a much less orthodox manner than in the usual run of books, and is approached from a definitely practical angle.

The writer, like most good teachers, has his little foibles, his likes and particularly his dislikes; he dislikes the expression 'chronic appendix'. It is a slovenly expression but it doesn't seem worth getting excited about.

The author might carry his puristic tendencies into the physiological field and not refer to the van den Bergh test as one for estimating *urobilin* in the blood.

The so-called radiological signs of appendicitis are fixity of the tip, kinking incapable of being straightened out, pain on pressure (it hardly needs a radiological examination to elicit this!) and bead-like filling defects due to the presence of transradiant concretions (these, incidentally, may be radio-opaque). But certainly the presence of these signs does not prove the appendix inflamed, nor does their absence disprove inflammation in it.

The 'chronic appendix' [we will use the expression if we want to] will test the complete integrity of the most high-minded surgeon to its limit, and beyond. This fact the writer obviously appreciates when he says 'once such a patient entertains the idea that there may be something wrong with the appendix, she (usually) is rarely satisfied . . . until someone removes the appendix and then it is only just in time! And it is quite true that although the surgeon can be quite positive that at the time of examination there is nothing wrong with the appendix, he dare not guarantee that it will not develop acute symptoms within a few weeks'. So what is the honest surgeon with any

consideration for his reputation, even if he hasn't a starving family, to do?

There are a very large number of useful skiagrams, photographs and charts throughout the book.

It is a book that we can recommend to the practising physician or surgeon and to the teacher.

ANUS, RECTUM, SIGMOID COLON. DIAGNOSIS AND TREATMENT.—By Harry Ellcott Bacon, B.S., M.D., F.A.C.S., F.A.P.S. 1938. J. B. Lippincott Company, Philadelphia and London. Pp. xxiv plus 855. With 487 illustrations. Price, 38s. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 28-8

WITHIN a generation proctology has attained an important position as a speciality in surgery. Dr. Bacon's book, to which Mr. Lockhart-Mummery contributes a foreword, is truly of the encyclopædic type and is expected to prove of value to proctologists and general surgeons alike, as a work of reference. The introduction by Dr. Wayne Babcock is cordial and appreciative and this book is described as the most complete and detailed work on proctology.

It is a book of considerable size containing 855 pages and 487 illustrations. There are altogether 24 chapters in this book. The earlier chapters deal with the anatomy, methods of examination, diagnosis and anaesthesia, and comprise 104 pages. The following chapters deal with separate pathological lesions such as cryptitis, anal fissure, pruritis ani and fistula-in-ano. Each section is complete in every detail and the differential diagnosis is particularly exhaustive and the operative technique is clearly described. The chapters on venereal diseases of the anus and rectum are worthy of note. Of ulcerations of the rectum and sigmoid mention must be made of chronic ulcerative colitis which is very clearly described. The chapters dealing with major surgery of the distal colon and rectum in case of malignant disease are written with great thoroughness. The management of colostomy is particularly praiseworthy.

We have gone through this book with both pleasure and benefit and feel sure that no general surgeon can afford to be without it. The subject-matter has been described throughout with conspicuous lucidity and precision. The illustrations are excellent and the printing and binding are praiseworthy. The bibliography is remarkably comprehensive and there is also a useful subject index.

P. N. R.

CANCER: ITS DIAGNOSIS AND TREATMENT.—By Max Cutler, M.D., and Franz Buschke, M.D. Assisted by Simeon T. Cantrell, M.D. 1938. W. B. Saunders Company, Limited, Philadelphia and London. Pp. viii plus 757. With 344 illustrations. Price, 45s. net

THE title of this book may appeal to a large section of the medical profession because the pressing problem of malignant disease deserves the dignity of separate treatment. It was, therefore, with some expectation that we approached the book, but we are constrained to state that we were disappointed. The illustrations are excellent but the supporting material is very meagre.

Radium is very much in the public eye at present and the laity cannot be blamed for believing it to be the only panacea for malignant disease. Statistics of radium therapy have their value but the important fact remains that carcinoma in accessible parts of the body can definitely be cured by adequate and early operative treatment. It is a statement which requires emphatic assertion. Telecurietherapy is admittedly an advance on the past, but sufficient evidence has already accumulated to indicate that the newer method of deep therapy by means of the 'continuously evacuated extra high voltage x-ray tube' is destined to supplant radium in a great measure, particularly in the case of the deeply-seated inaccessible new growth. It is regrettable that in the chapter on radiation therapy there is no mention of this potent therapeutic agent. There is

also no mention of the good results obtained by means of the low voltage contact therapy (Chaoul therapy). In a book of this character, such glaring omissions would be sufficient condemnation.

The authors have taken pains to explain that the special purpose of this work is to make accessible to the reader a critical evaluation of the pertinent facts in the diagnosis, prognosis and treatment of cancer. Under the semi-popular title of cancer, the authors have included sarcoma and neoplasms of bone although it is not customary to do so. It is, however, clear that cancer is a term which is readily understood by the non-medical reader. Nevertheless, it has to be admitted that the object of the authors is laudable, though difficult of attainment because interpretation of clinical data demands not merely experience but also judgment. For example, the authors have ascribed the remarkable freedom of the Jewish people from carcinomata of the penis and uterus to the influence of 'inherent racial susceptibility'. A more rational explanation would point to improved sex hygiene in the male and consequent freedom from chronic cervicitis in the female. It may be remembered that chronic infection and lymphatic stasis are not unimportant predisposing factors in carcinogenesis. Finally, it may be asked if the subject of carcinogenesis may rightly be excluded from a volume which deals exclusively with carcinoma?

It is evident that much hard work has gone into the making of this book but unless the defects are remedied it is not likely to be of use to those for whom it is intended. We are afraid there is very little use for a handsome expensive album on malignant disease.

P. N. R.

A TEXTBOOK OF SURGICAL PATHOLOGY.—By C. F. W. Illingworth, M.D., F.R.C.S. (Edin.), and B. M. Dick, M.B., F.R.C.S. (Edin.). Third Edition. 1938. J. and A. Churchill Limited, London. Pp. viii plus 727, with 299 illustrations. Price, 36s.

SINCE its first publication in 1932, this book has been well known to the students of special pathology, particularly those going up for the Fellowship examination in surgery. The subject of surgical pathology is by no means an easy one and the task of writing a textbook on such a subject is very arduous indeed. In getting up this volume the authors have collected data not only from the operating theatre and post-mortem rooms, but from pathological research laboratories as well. In spite of the frank warning 'presuming a certain knowledge of general pathology on the part of our readers' the first four chapters, namely those on inflammation, wound infection, surgical shock and burns, are so lucidly written that even a busy general practitioner will find the reading extremely interesting and containing an epitome of the most up-to-date ideas and information.

Of the specific infective diseases, tuberculosis, actinomycosis and hydatid disease have been dealt with in detail in separate chapters. In the chapter on tumours one finds all the latest information on the researches on the genesis, onset, propagation and spread of carcinomatous growths, and the classification of tumours is really admirable in its simplicity. The rest of the 26 chapters cover the diseases of the bones, joints, and the different systems of the body of which the pathology of the diseases of the brain, spinal cord, pituitary and adrenal glands are worthy of special note.

In connection with diseases of the female generative tract, an extremely rare tumour like arrhenoblastoma has been mentioned. The photographs of the specimens are from the museum of the Royal College of Surgeons and the photomicrographs of sections from the cabinet gallery of the Royal College of Physicians, Edinburgh; they constitute a very valuable integral part of the book, not only for the text but for reference as well.

After going through this volume one is just a bit disappointed that the authors thought fit to leave the diseases of the eye, ear and nose completely out of

their scope. Considering the reputation and ability of the authors the inclusion of chapters on these subjects in future editions of this book will be welcomed by the student, as well as the pathologist.

K. P. B.

ESSENTIALS OF PATHOLOGY.—By L. W. Smith, M.D., and E. S. Gault, M.D. 1938. D. Appleton-Century Company, Incorporated, New York and London. Pp. xxi plus 886, with numerous plates. Price, 35s.

THERE are many well-known books on general pathology that have gone through a number of editions and have survived their original authors. We are not quite sure whether this practice of reissuing new editions of old books is a good one and whether it is not better for the new generation to make a completely fresh start and, unhampered by the earlier tradition, produce an entirely new book. Such a procedure does not mean that full use should not be made of older teaching and other books, even to the extent of quoting long passages or reproducing illustrations.

There is in the volume under review much that is new in the method of presentation of the subject. It is eminently practical and close touch with clinical medicine is maintained—in fact forced upon the student—by the inclusion of at least one case history with each pathological picture that is drawn. It is such a natural procedure that one does not at first realize that it is not the usual method in textbooks of pathology. In later years, when one turns to one's textbooks on pathology, one automatically supplies the clinical picture from personal experience, but when the student first learns pathology it is liable to be as a subject apart, for at that period of his career he has practically no clinical experience on which to draw. There is a wealth of illustrations, most of which mean something, and this is not always the case in textbooks. Where it seemed advisable, drawings are substituted for photographs, but the majority of the illustrations are the latter. Most of the drawings are in colour and these are well executed, clear but not too diagrammatic.

A number of pages are devoted to parasitic diseases, of protozoa and helminths. The authors excuse this on the grounds that travel is so rapid in these days that nearly all diseases are cosmopolitan. Is it just 'insularity', which is incidentally a much more pronounced trait in the United States of America than amongst the island-dwellers of western Europe, or just modesty, that makes them overlook the possibility that not only may the parasitic diseases go to Mohammed but the Koran may find its way to the lands where these parasitic diseases flourish?

The reader with a poorer vocabulary will find it difficult to get used to some of the American applications. For example, 'gross'—a good old English word—is used as a substitute for 'naked eye', admittedly a clumsy compound adjective, in the sense 'naked-eye appearances'. But when one reads 'These nodules may be seen *grossly* on the surface of the spleen', it is a little bit of a shock.

We noticed a few minor mistakes, such as the reference in the caption of figure 488 to figure 482, when obviously 481 was intended, but otherwise the book seems to have been produced with the greatest care.

Finally, we should like to congratulate the publishers on their format. When deciding on the size of a volume publishers and authors should make up their minds whether the book will be read mostly in the hand or on a table, if the latter then it must not be too thick and it must open flat, but a little freedom can be exercised in the size of the page. The present volume with its large page, $8\frac{1}{2} \times 11\frac{1}{2}$ inches, is an ideal book to read on the table or laboratory bench.

It is a book that we can unhesitatingly recommend to physicians, students, and pathologists, particularly teachers of pathology.

THE NEW INTERNATIONAL CLINICS.—Edited by Giorgio M. Piersol, M.D. Volume III. New Series one (old 48th). 1938. J. B. Lippincott Company, Philadelphia and London. Pp. iv plus 341. Illustrated. Price, £2 10s. per set of 4 volumes. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta

THIS volume of the *New International Clinics* contains a number of important and useful articles. The position of the practitioner who may not have all the latest appliances for diagnosis and treatment at his disposal is appreciated by many of the writers, so that these quarterly publications should have a wide appeal.

There are two articles on obesity, both give the same message, namely, that the only way to reduce a patient's weight is by making him restrict his, or more often her, diet. One writer insists that a rigid diet should be prescribed and the patient allowed no licence; the other considers that it is better to make the patient understand the principles of dietary and above all appreciate the seriousness of the disease (obesity).

This latter writer, Dr. Fred. M. Hanes, considers that obesity is no matter for joking, though he quotes one or two trite sayings, such as that the pleasures of life are always illegal, immoral, or make you fat and that there are three stages of obesity, the enviable, the laughable, and the pitiable.

There is an article on the testing of liver extracts, which is interesting but rather discouraging. Little progress has been made in testing these outside the wards of a hospital. The partial success of Rhoads and Miller with pigs on a 'black-tongue' diet is recorded, but there is no reference to Wills's work with monkeys. The writers conclude that 'such anemic swine may eventually prove of use as test animals'. [We might remind readers that this is not a clinical article.]

A HANDBOOK OF MIDWIFERY: FOR OBSTETRIC DRESSERS, PUPIL-MIDWIVES AND MIDWIVES.—By Sir C. Berkeley, M.A., M.C., M.D. (Cantab.), F.R.C.P. (Lond.), F.R.C.S. (Eng.), M.M.S.A. (Hon.), F.C.O.G. Tenth Edition. 1938. Cassell and Company, Limited, London. Pp. x plus 633, with colour frontispiece and 81 illustrations in the text. Price, 8s.

THE tenth edition of this popular book will be as widely used as ever by nurses sitting for the C.M.B. examination and as a book of reference after qualifying. The rather detailed nature of its contents, although rather more than will be required for the examination, will be very welcome to the midwife with a difficult case on her hands.

After reading *The Abnormal in Obstetrics* by the same author in collaboration with Victor Bonney, one was surprised to find that the latest ideas as set forth in that volume were very often not mentioned in the *Handbook of Midwifery*, older methods being given instead. For instance, the treatment of eclampsia is dealt with in a very different manner in the two books. Surely, the most advanced lines of treatment should be advocated for midwives and obstetricians alike!

However, there is no doubt that the book is a very sound little volume. Its small size makes it handy for fitting into the midwife's bag, although this advantage is somewhat outweighed by the small print used.

G. P. C.

HANDBOOK FOR MIDWIVES AND MATERNITY NURSES.—By Mary Mayers, S.R.N., S.C.M. Second Edition. 1938. Baillière, Tindall and Cox, London. Pp. xii plus 476. Illustrated. Price, 8s. 6d.

THIS textbook has proved its popularity by requiring a second edition only 20 months after the first. There is a lot to be said for a textbook for midwives being written by a member of the nursing profession. Miss Gemmel, as a sister tutor, probably has a closer insight into the difficulties and the best method of teaching midwives than can be attained by a member of the medical profession. This advantage probably

more than counterbalances the various unimportant errors which crop up in various places in the text.

The fairly detailed anatomy and physiology is good. Oestrin and progesterin are mentioned, but a short paragraph on their functions would have been appropriate. Miss Mayers states that vitamin E is usually prescribed in sterile matings. Perhaps so, but it is of very doubtful value, whereas the importance of vitamin E as a prophylactic against abortion is not mentioned.

When describing the disadvantages of premature rupture of the membranes the author stresses in two places in the book that slow-dilatation and delayed labour result. This old teaching has been disproved time and again, although, of course, it holds true where the premature rupture is due to some disproportion. It is but to be expected that the old vice of the nursing profession of giving aperients to patients prior to operation should find a place in this book. Why must patients have their vitality lowered just when they need it most?

In spite of such criticism the general impression gained is that the book is very sound, is simply and attractively written, well illustrated and is printed in large clear type.

G. P. C.

DIETS FOR DIABETES ARRANGED IN MENU FORM.

—G. E. Beaumont, M.A., D.M. (Oxon.), F.R.C.P., D.P.H. 1938. J. and A. Churchill, Limited, London. Pp. vi plus 49. Price, 2s.

This little book seeks to present diets for diabetics in menu form. It starts with diet no. 1 which contains as little carbohydrate as 7.5 grammes, protein 15.2 grammes and fat 9.6 grammes, yielding a total caloric value of 178 only! Even as we proceed to diet no. 8, we still find the carbohydrate content to be as low as 50.5 grammes, yielding a total caloric value of 1,398 only, which we consider to be quite insufficient for a man of average height and weight doing ordinary work. While there is no doubt that the presentation of these various diets in suitable menu form will offer to the patient an easy method of selecting meals which will suit both his appetite and taste, we have our doubts as to how far, in view of the present-day dietetic principles of treatment, these diets would prove to be useful.

J. P. B.

BIOCHEMISTRY FOR MEDICAL, DENTAL AND COLLEGE STUDENTS.—By Benjamin Harrow, Ph.D. 1938. First Edition. W. B. Saunders Company, Philadelphia and London. Pp. 383. Illustrated. Price, 17s.

The subject of biochemistry has during the last few years become of considerable importance in the practice of medicine. In fact, the present-day activity in biochemistry appears to be as varied as it is intensive, and some of the most sensational successes in recent times have been in the field of vitamins, hormones and enzymes.

It is therefore essential for modern students of medicine to be thoroughly acquainted with the main principles of biochemistry and the present volume appears to be an excellent one to help them in getting a clear insight into the subject. The book includes the latest developments in biochemistry, more particularly in the region of vitamins (described in chapter 8) and hormones (described in chapter 23).

The book covers more than the usual requirements of the student, and would, we believe, be of great help to them in pursuing their studies in the subject.

J. P. B.

APPLIED ANATOMY: FUNCTIONAL AND TOPOGRAPHICAL.—By R. H. Miller, M.D. 1938. Henry Kimpton, London. Pp. 484. Illustrated with 55 engravings and 16 coloured plates. Price, 30s.

This book is, in the reviewer's opinion, an excellent production because it describes on a regional basis the

essential anatomical points of the body structures that a practising physician or surgeon needs to remind himself of. As it is divorced from the amount of detail that the ordinary textbook of anatomy contains, it will enable the busy doctor rapidly to brush up the necessary information on any special problem with which he may be faced in his daily round.

This book will not be of great use to students still familiar with detailed anatomy except perhaps as a means of rapid revision to those sitting for their final examination, but it is essentially a book for the practitioner of some years' standing in whose memory the thousands of anatomical details are becoming dim.

It is copiously illustrated and a large proportion of the figures have been borrowed from Gray's anatomy.

CATALOGUE OF LEWIS'S MEDICAL AND SCIENTIFIC LENDING LIBRARY. Part I: Authors and Titles. 1938. H. K. Lewis and Company, Limited, London. Pp. viii plus 550. Price, 16s. (To Subscribers, 8s.)

Lewis's Library is a tradition amongst medical students in England, a tradition which they often maintain throughout their medical careers. Not infrequently have we heard a student who found it difficult to uphold his particular hospital pointing out its proximity to Lewis's as one of its main advantages. The library was founded in 1848 and so is not far off its centenary.

The subscriptions to the library are scaled according to the number of books taken out at a time, and vary from 7s. for one volume for three months to £15 for thirty volumes, for a year. A small deposit is asked from foreign subscribers.

The Catalogue is issued in two volumes, part I being 'authors and titles' in which the arrangement is alphabetical according to the name of the first author. The second part will be a classified index of subjects.

The Catalogue contains the names of 20,000 books on medical and allied scientific subjects. It is of course essential for subscribers who live any distance from Gower Street to possess these books, and librarians will find them very useful as books of reference.

DISPENSARY LABEL BOOK. Printed at The Merchants Press, 85, Nainappa Nalck Street, Park Town, Madras. Price, Re. 1

This book is what its name suggests. It consists of printed labels for dispensary use; these can be cut out and pasted on bottles. Doses are given in smaller print.

There are in this book nearly a thousand different labels.

The book should prove very popular amongst those who like to keep their dispensaries neat and tidy.

The only improvement that suggests itself to us is the perforation of the pages so that the labels could be torn out easily.

Abstracts from Reports

ANNUAL REPORT OF THE ALL-INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH, CALCUTTA, FOR THE YEAR 1937

The institute has till now produced four batches of Diplomates in Public Health. An enquiry was instituted with a view to ascertaining how far India had made use of the graduates of the institute and how they were being employed. A request was made to the ex-students to supply information regarding their employment and the nature of their duties. The response shows that about two-thirds of the graduates, which the institute has produced since 1934, hold official positions, but that less than half are engaged in public health or research work. Most of the employees are government servants. Local bodies and other authorities who are mainly responsible for the

administration of public health, employ only a small number.

Epidemic dropsy.—The mode of causation of epidemic dropsy has so far remained unknown and treatment is also unsatisfactory. For the last three years, researches have been conducted at the institute on its aetiology. Many of the current theories have been investigated critically, and the work done seems to have incriminated mustard oil as the medium by which the toxic substances responsible for the disease are taken into the human body. Attempts are now being made to isolate these toxins in the oil and to study their chemical and pharmacological properties. Methods for detecting the presence of these substances in suspected samples of oil are also under investigation; it is hoped that the problem of its causation will shortly be solved.

Forecasting cholera epidemics.—A method of forecasting cholera epidemics which proved useful for the control of the disease has been applied by the institute, with respect to certain areas in Bengal, not inappropriately considered to be the home of cholera.

A study has also been made of the causes of the periodic rise in malarial incidence in certain endemic areas in Bengal. It has been found that the sudden exacerbations in malarial incidence, which usually take place every five or six years, are in all probability associated with unusual rainfall in the dry months, especially February and March. If the rainfall is markedly high in the dry months even when the total annual rainfall remains unchanged, the incidence of malarial fever may be expected to be higher than in other years. The work is of special interest as results are likely to be of great assistance in the organization of anti-malaria campaigns.

Treatment for black-water fever.—Black-water fever has hitherto defied treatment to a large extent. Researches conducted at the institute during the past few years have not only indicated the manner in which black-water fever is caused, but have also helped in the elaboration of a new line of treatment which has so far given encouraging results.

In kala-azar, investigations are now being made into the problem of susceptibility to the disease. Kala-azar has not yet been experimentally produced in man, but man suffers from it in nature. This, it is thought, is probably due to the fact that infection results only when resistance is lowered.

Maternal mortality investigations.—Investigations have also been made into the causes of maternal deaths in Calcutta. Over 90 per cent of these deaths, it has been found, were preventable, and the conclusion was reached that maternity need not be attended with such grave risks if the expectant mother could be given adequate medical supervision during pregnancy, at the time of delivery and for a few weeks following confinement. The enquiry has also revealed that one of the important causes of maternal deaths is 'pregnancy anaemia'. Investigations are in progress for finding out the responsible causal factors and the best method of treatment.

A model maternity and child welfare centre attached to the institute gives practical demonstrations of how maternity and child welfare work can be carried out under Indian conditions. The staff of the clinic, under the supervision of the Professor of Maternity and Child Welfare, tries to get in touch with pregnant women by house to house visits and to teach them healthy ways of living. Periodical examinations are made to ascertain whether any abnormal conditions exist, the babies are delivered in the homes in all normal cases, the mothers and infants are looked after and further examinations and treatment are given where necessary.

A nursery school is attached to the clinic, admission being confined to children between the ages of 2 and 5 years. A specially trained member of the staff teaches them healthy habits, discipline and sociability, while games are arranged for the development of their minds and bodies. Through the activities of the clinic and by means of special lectures and instructions in

mothercraft, the centre helps to create health consciousness amongst women.

Decline in infantile mortality.—Analysis of figures for infantile mortality shows a decline in the rate within recent years, although, as compared with those of Great Britain, the figures are still high. The problem of infantile mortality is closely related to that of infant nutrition. A beginning has been made on research into this subject.

The Nutrition Department has been conducting diet surveys amongst certain classes of people in Bengal and Assam. The diet of the Assamese coolie has been found poor both in quality and quantity, and particularly deficient in proteins, fats, minerals and vitamins. The heights and weights of Assamese children fall much below the normal and also below that of well-to-do groups. The diet of well-to-do residents in Calcutta has been found to compare favourably with that of European standard except that it contains an excess of fat.

The trend of population growth in India has lately come under investigation in the Statistical Department of the institute. The studies made show that 'measures directed towards the reduction of mortality will also help to lower the birth rate'.

Tuberculosis and industry.—In the tuberculosis enquiry carried on in the institute, a study is being made of the relationship of certain industries to the disease. India is becoming more industrialized and urbanized and this new factor has been held responsible for a marked increase in the incidence of the disease. The jute industry is particularly being studied to find out how far it contributes towards the spread of tuberculosis.

The work so far conducted reveals that the majority of the cases of tuberculosis in jute mills are found among the poorer labourers living in ill-ventilated and insanitary tenements. The fact that susceptible persons are migrating to take up work in these industrial concerns is also held to be to some extent responsible for the severe type of tuberculosis prevalent amongst the mill workers.

ADMINISTRATION REPORT OF THE DIRECTOR OF MEDICAL AND SANITARY SERVICES, CEYLON, FOR 1937

THE most prevalent general diseases of hospital in-patients were rheumatism, intestinal disorders (diarrhoea and enteritis), bronchitis, and pneumonia. Year by year the number of patients who seek hospital treatment for cancer is increasing.

The incidence of plague compared with the average for the previous five years (57) has decreased to 29 during 1937. Of these, 20 cases were of the bubonic variety and nine septicæmic.

There were no cases of cholera during 1937 in the island.

There were two cases of smallpox in February 1937, and both these cases were among new arrivals from India.

One hundred and thirty-five cases of diphtheria compared with 103 cases in 1936 were reported during the year with 21 deaths, giving a fatality rate of 15.55 per cent.

Seven thousand, two hundred and forty-eight cases of measles compared with 2,775 in 1936 were reported during the year with 26 deaths giving a fatality rate of 0.35 per cent.

The actual prevalence of enteric fever cannot be judged from hospital admissions since many cases resort to ayurvedic treatment and the majority of cases probably are not notified. The number of registered deaths does not indicate the actual mortality from this disease, as some deaths from enteric are undoubtedly included amongst those reported as due to pyrexia. There were 13,918 deaths due to pyrexia in 1937 as against 14,520 in 1936. Two thousand, six hundred and twenty-nine cases were notified in 1937 as compared with 2,503 in 1936, with 502 deaths, giving a fatality rate of 19.09 per cent.

Three thousand and ninety-three cases or 51.0 per cent of the total number of dysentery cases were stated to be amœbic, 1,564 cases or 25.9 per cent bacillary, and the balance 1,380 or 23.1 per cent undefined. These figures, however, are not of great value since the distinction was often made on clinical grounds.

Tuberculosis of the lungs.—The following table shows a comparison between the figures for 1937 and the figures for the previous four years:—

	1933	1934	1935	1936	1937
Hospital cases ..	4,229	4,278	4,851	4,449	4,554
Hospital deaths ..	1,108	1,126	1,382	1,054	1,169
Total number of deaths registered for the island ..	3,118	3,091	3,387	3,167	3,145

Leprosy.—During the year 1,292 cases with 84 deaths, as against 1,253 cases with 74 deaths in 1936, were treated at Government hospitals including the two asylums which are maintained in the island for the segregation of lepers.

During the year 30,411 children in 208 schools were examined and 16 cases detected of whom eight had definite lesions and eight indefinite lesions.

The total area covered by the survey was about 2,000 square miles with a population of over 600,000.

With the organization of the Malaria Control and Health Scheme the control of yaws has been placed on a more satisfactory basis. Each of the field medical officers and medical officers of health is responsible for the control of the disease in his area. Every case in the area is put on a card, inspected and re-inspected every six months, and necessary treatment given. Villages, in which cases are found, are carefully inspected half-yearly for detection of new cases.

HYGIENE AND SANITATION

Public health work continues to make steady progress. The Malaria Control and Health Scheme which was launched during the latter part of 1936 was extended during 1937 to include the whole of the North-Western Province, the Matale and Kandy Districts of the Central Province, Province of Sabaragamuwa with the exception of Kolonnua and Kukul Korales, Mannar and Mullaitivu Districts and the Tenmaradchi and P. . . . divisions of the Northern Province, Hambantota Districts and Gaugaboda pattu in the Galle District of the Southern Province, certain areas in the Batticaloa District of the Eastern Province, one chief headman's division of the Province of Uva, Hurulu, Kalagam palatas, and Tammankaduwa division of the North-Central Province, and three chief headmen's divisions in the Western Province.

General sanitation has received the same attention as in previous years. The two important items under this head are: control of soil pollution and the provision of protected water supplies.

In the control of soil pollution during the year 4,672 bucket latrines were constructed in urban areas as compared with 3,687 in 1936; 16,619 deep pit latrines in rural areas as compared with 13,639 in 1936; 179 bored-hole latrines as compared with 312 in 1936; 322 mound latrines as compared with 263 in 1936 making a total of 21,792 as compared with 17,901 in 1936.

In order to hasten the construction of latrines a five-year programme has been formulated for areas under sanitary assistants (inspectors) and every effort is being made completely to sanitize villages. There still continues to be a good deal of indifference on the part of villagers to construct latrines.

In regard to the provision of protected water supplies during the year 281 new public wells and 4,215 new private wells were constructed, and 2,794 wells were improved.

The annual grant for the construction of wells in rural areas is inadequate to meet the problem in a satisfactory manner. When village committees construct wells out of their own funds they prefer to build wells for bathing purposes rather than for drinking

purposes. Till such time as an adequate number of protected wells are provided, the people are being educated to boil their drinking water.

Housing in urban areas is under control and small housing schemes have been carried out. In rural areas all that has been done has been in relation to peasant colonization schemes in connection with which dwellings are being constructed in accordance with two type plans supplied by the department; one for the married and the other for the unmarried settler. In the construction of these dwellings each settler is given a government subsidy.

On estates regular inspection has been carried out on labourers' lines and government requirements were met with in the case of 59,067 rooms as compared with 49,351 in 1936.

Maternity and child welfare work continues to receive popular support. The work has been carried out at 207 centres as compared with 77 in 1936; at which 8,395 clinics have been held as compared with 4,513 clinics in 1936; with a total attendance of 39,841 expectant mothers as compared with 17,393 in 1936, 88,479 infants as compared with 29,563 in 1936, and 39,637 pre-school children as compared with 18,611 in 1936. These increased numbers are due to the large number of field medical officers and associated staff who have been appointed. The infant mortality shows a reduction from 166 in 1936 to 158 in 1937 and the maternal mortality rates from 21.6 in 1936 to 19.9 in 1937. In limited areas where intensive work is being done with an adequate staff of public health nurses and midwives the reduction in mortality rates is very encouraging.

On school health work depends the future of the public health work of the country. A good deal of attention has been paid to the health of the school child and the work is being appreciated by all concerned with the result that work is receiving more co-operation.

The hookworm campaign was carried out with more intensity and 2,163,373 treatments were given as compared with 1,855,572 in 1936 and 1,401,962 in 1935.

The leprosy survey, which had completed and organized its work in the Eastern, Western, Sabaragamuwa, and Southern Provinces, extended its work to the North-Western Province, and continued follow-up work in the former provinces.

An island survey of filariasis was undertaken and is in progress. Control work in a demonstration area in Dewameddi Hatpattu in the North-Western Province is being undertaken, and action is being taken for the removal of the pistia plant throughout the island.

Health work under Urban District Councils is being carried out satisfactorily. One council continues to have its own Medical Officer of Health who is a private practitioner and another council nominally has the departmental Medical Officer of Health in an executive capacity without getting him to function as such.

Health Unit work which was inaugurated in 11 areas is now the type of work that is being carried out in the major part of the island and continues to be satisfactory in every respect.

REPORT OF THE SUDAN MEDICAL SERVICE FOR THE YEAR 1937

YELLOW FEVER

The examination of liver sections from fatal cases of obscure pyrexia.—During the year eight viscerotome specimens of livers were examined histologically but in no instances were the morbid changes suggestive of yellow fever.

Mouse-protection tests.—In March 1937, Dr. G. M. Findlay of the Wellcome Bureau of Scientific Research, London, visited the Sudan, and collected a further series of human and animal sera from the Nuba Mountains and Sennar districts.

(a) *Human sera.*—The results, which will be published in full by him, confirm completely the findings

of last year. The high infectious rate (70 per cent and over) in the Kau district is still noticeable as is also the apparent rural distribution of the virus, and a striking difference in the percentage of positive sera from adjacent and apparently similar districts.

The mouse-protection test has also been carried out on the sera of a number of cases of obscure febrile jaundice. Of 34 sera nine have been positive and 25 negative. Little significance can be attached to a positive result in these cases unless a previous test (at an early stage of the illness) has been negative. In three cases in Malakal it has been possible to test the serum twice in this fashion, and the results are suggestive. Blood taken on the 10th day of illness was negative in all three cases. A second sample taken 12 days later was negative in one case, but in the other two it protected three out of six mice used in the test—a positive result, which has developed during the course of the illness.

The sera of five persons who visited Kau during the rainy season in 1936 were also tested by Dr. Findlay and all but one were positive. Two of these positives are particularly interesting—a British medical inspector whose blood was known to be negative a year previously and an assistant medical officer from the northern Sudan, posted to Kau in 1936. They both had an attack of fever at the same time in Kau. It was noted that the fever was not influenced by atabrin, and that a few evenings previously both had been badly bitten by mosquitoes while sitting out talking to local notables.

These results suggest that during the last two years there have been at least three human infections with the virus of yellow fever.

(b) *Animal sera*.—In the 1936 report it was mentioned that immune bodies had been demonstrated in two cows from Kordofan, and in one monkey.

During his tour this year Dr. Findlay obtained sera from wild and domestic animals in Kau. Among the latter, immune bodies were found in four out of 20 cows, two out of five dogs, and three out of 11 pigs. No positive sera were obtained from any of the wild animals from Kau, although numbers were tested, including ground squirrels, rats, monkeys, lizards, bats and mongoose.

An attempt was made in London to infect six gerbils, sent from the Sudan, with yellow fever, but these animals proved completely resistant to both neurotropic and viscerotropic virus intracerebrally.

Mosquito survey.—This is considered in the entomologist's report, but mention may be made here of the discovery of *Aedes* breeding in 'tebelidi' trees in entirely rural surroundings, two miles from the nearest human habitation.

Correspondence

INHIBITORY INFLUENCE OF CHRONIC AMOEBIASIS ON IMMUNITY AGAINST BACTERIAL INFECTION

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Some years ago an European boy of about six years was brought to us for treatment of scabies. On culture of pus from one of the pustules, *Staphylococcus aureus* was obtained. A course of 5 injections of autovaccine was given, apparently without any effect. New pustules were developing during the course of treatment by autovaccine. Repeated culture of pus showed the same *Staphylococcus aureus*. There was no previous history of dysentery. There was no bowel complaints except occasional constipation. Yet we examined the stool of the boy and we were surprised to find the presence of vegetative forms of *Entamoeba histolytica*. On giving a course of only three injections of $\frac{1}{2}$ grain

of emeline, the scabies* disappeared quickly. This finding strongly suggested to us that probably chronic amoebiasis had an inhibitory influence on the formation of antibodies in the system against bacterial infection. Since this case we encountered at least 15 other cases of chronic staphylococcal eczema, streptococcal pustules on the fingers and palms which resisted all treatment by autovaccine and local medication. On examination of stools of all these cases *Entamoeba histolytica* either in the vegetative or cystic forms was found. A combined treatment with emetine and autovaccine invariably cured these cases. Some had relapse and re-examination of stool revealed the presence of *Entamoeba histolytica* cysts. Evidently amoebiasis was not altogether cured by treatment. Intensive course of treatment with emetine and stovarsol finally cured those cases permanently. These observations lead us to believe that the presence of amoebic infection has a definite inhibitory influence on bacterial immunity. Chronic skin diseases due to staphylococcus are often encountered among apparently healthy people of this country, particularly those living in the villages. Chronic amoebiasis is an extremely common condition among the people of this country and it is our definite opinion that amoebiasis plays a great rôle in the chronicity of bacterial skin infection (excluding fungus) by exerting an inhibitory influence on the natural formation of immune bodies.

Yours, etc.,

H. GHOSH, M.B., M.S.P.E. (Paris),
Director.

DEPARTMENT OF BACTERIOLOGY,
INDIAN INSTITUTE FOR MEDICAL
RESEARCH, CALCUTTA.

* [Note.—Our correspondent apparently means staphylococcal infection secondary to scabies.—EDITOR, I. M. G.]

A NOTE ON THE DESTRUCTION OF MOSQUITOES CAUGHT IN THE MODIFIED VILLAGE MOSQUITO TRAP* DURING MONSOON

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—During the monsoon the trapped mosquitoes are killed by putting the pot on a hearth which will raise the inside air temperature to 60°C. (140°F.). At this temperature the inside air is hot; the bottom of the pot is very hot, but the sides are merely warm. By this time all the mosquitoes will be found dead, and the pot is removed from the hearth. The whole operation takes about fifteen minutes using a moderate fire.

This method could be used any time or throughout the year, being available, quick and clean.

Yours, etc.,

RAMKRISHNA N. GORE, L.M.S.

GHOBBUNDER ROAD,
KHAR, BOMBAY, 21,
23rd January, 1939.

COLSULANYDE IN QUINSY

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I wish to report the following case in your esteemed journal, and hope you will consider it.

R. B., aged 35, a mill-worker, called at this hospital with slight bleeding from the mouth on spitting, great difficulty on swallowing even semi-solid foods, and pain all over the mouth and head. He was running a temperature of 102°F. An examination of the throat revealed a left-sided 'quinsy' with marked congestion

* Gore, R. N. (1937). A Modified Village Mosquito Trap. *Indian Med. Gaz.*, Vol. LXXII, p. 674.

on the right tonsils also. On refusal of the patient for surgical treatment he was given on the first day 10 c.c.m. of 0.4 per cent 'Colsulanyde' (Crookes) intravenously and 2 tablets three times a day. Second day—marked improvement, but was given another injection and tablets by mouth. Third day—no fever, no bleeding, very little pain. Only tablets were given that day and next day the patient reported that he was completely all right.

The point of interest in this case was that no surgical treatment was done, and the only local treatment advised was salt gargle.

I wish to point out that I have tried this preparation of sulphanilamide in a series of cases of tonsillitis and allied conditions, and have found it very efficient.

Yours, etc.,

G. S. GOPALAN, L.M.P. (Madras).

12, MAIN ROAD,
PERAMBUR, MADRAS,
6th January, 1939.

A PROBABLE CAUSE OF THE DIFFICULTY OF TREATING CHRONIC AMOEBIC INFECTION IN THIS COUNTRY

To the Editor, THE INDIAN MEDICAL GAZETTE

Re: Article by Dr. H. Ghosh concerning the probable cause of the difficulty in treating chronic amoebic infection in your issue of January 1939.

SIR,—I have not known a single uncomplicated case of chronic amoebic dysentery fail to respond to the emetine bismuth iodide and yaten lavage treatment laid down by Dr. Manson-Bahr. Those cases which relapsed had definitely acquired a chronic bacillary dysentery infection as well, and a certain number of these cases undoubtedly had a further streptococcal infection. The bacillary infections were mainly Flexner and an intolerance for rice diet can be understood.

Yours, etc.,

C. E. R. NORMAN,
Chief Medical Officer,
South Indian Railway.

TRICHINOPOLY,
31st January, 1939.

PRAWNS AS A POSSIBLE VECTOR OF V. CHOLERÆ

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I have read Dr. K. P. Kundu's article on 'Prawns as a possible vector of *V. cholera*', published in the October 1938 issue of your *Gazette*, with keen interest. Heiberg (1935, 1936) as a rejoinder to the publication by Gardner and Venkatraman (1935) showed that the vibrios could be grouped into 6 by fermentation reaction of three sugars, mamose, saccharose and arabinose, as Gardner and Venkatraman were of opinion that vibrios could not be grouped by biochemical reactions. Taylor, Pandit and Read (1936, 1937) later on showed that Heiberg groups could be increased by one more. Gardner and Venkatraman on analysis of 'O' antigens of vibrios by serology, could group the vibrios into 6 'O' sub-groups. We could group the vibrios sharply into two groups, one could group the vibrios sharply into two groups, one by typical cholera vibrio, others non-cholera vibrio, by inhibition or fixation of specific cholera bacteriophage type 'A', a finding similar to that of Bruce-White (1936). Heiberg group I, Gardner and Venkatraman 'O' sub-group I and inhibition group I (unpublished) all include the typical *Vibrio cholera*, Inaba or Ogawa type. While the latter two groupings never include any non-cholera vibrios, Heiberg group I includes these vibrios besides the typical vibrio cholera, Inaba or Ogawa. Heiberg group II does not include the typical *Vibrio cholera* (*loc. cit.*) and when Dr. Kundu showed that typical *Vibrio cholera* of Heiberg type II were isolated from prawns, a suspicion arises about the

validity of the tests employed, biochemical and serological. The vibrios isolated from the prawns may share the 'H' antigen to the full titre of a typical cholera vibrio but that does not mean that they share the same 'O' antigen of a true cholera vibrio, Inaba or Ogawa. Now that the analysis of the 'O' receptor of typical cholera vibrio is complete by Bruce-White (1936a) and the antigen is shared by no other vibrios except cholera, mistakes of declaring a vibrio as typical cholera vibrio should not be committed any longer. On account of this mistake, the validity of much past research on cholera is even now disputed. Dr. Kundu's vibrios isolated from prawns A and B should be subjected to a thorough 'O' receptor analysis before they could be identified as typical cholera vibrio, Inaba or Ogawa. In view of the above consideration I do not like to comment on his summary of conclusions.

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Yours, etc.,

N. M. MAITRA, B.Sc., M.B.,
Field Bacteriologist,
Dhubri Cholera Field Unit
(I. R. F. A.).

DHUBRI,
31st January, 1939.

ANTI-TETANUS SERUM

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—The prices quoted for anti-tetanus serum in the paper on 'A Study of Treatment of Tetanus Based on a Review of 38 Cases for the year 1932-1937' in your January issue are apparently those charged for serum of continental origin.

I have recently found that equally efficacious serum is obtainable at a much cheaper rate from a well-known firm of English manufacturers.

This may be of interest to your readers.

Yours, etc.,

A. B. C.

Service Notes

APPOINTMENTS AND TRANSFERS

COLONEL F. F. S. SMITH to be A. D. M. S., Peshawar District. Dated the 17th December, 1938.

Colonel D. F. Murphy, M.C., to be O. C., I. M. H., Secunderabad. Dated the 12th December, 1938.

Colonel N. S. Sodhi, on return from leave, resumed his duties as Inspector-General of Civil Hospitals, Burma, vice Lieutenant-Colonel J. Findlay, on the forenoon of the 27th January, 1939.

Lieutenant-Colonel Philip Verdon, permanent District Medical Officer and Superintendent, Government Headquarters Hospital, Guntur, and Acting Superintendent, Government Ophthalmic Hospital, Professor of Ophthalmology, Medical College, and Medical Officer, Civil Orphan Asylum, Madras, to be Superintendent, Government Ophthalmic Hospital, Professor

of Ophthalmology Medical College and Medical Officer, Civil Orphan Asylum, Madras, with effect from the 15th November, 1938, *vice* Lieutenant-Colonel R. E. Wright, C.I.E., I.M.S., retired.

Lieutenant-Colonel L. F. Brandenburg to be Officiating A. D. M. S., Madras District. Dated the 30th November, 1938.

Lieutenant-Colonel N. J. Gai to be O. C., I. M. H., Jullundur. Dated the 13th December, 1938.

Lieutenant-Colonel H. S. Rajan to be O. C., I. M. H., Jhansi. Dated the 10th December, 1938.

Lieutenant-Colonel N. S. Jatar, C.I.E., D.S.O., is on return from leave re-posted as Inspector-General of Prisons, C. P. and Berar, with effect from the 3rd January, 1939.

Lieutenant-Colonel P. D. Chopra has, on expiry of his leave, been placed on special duty in the Office of the Inspector-General of Prisons, Punjab, as Secretary to the All-India Inspectors-General of Prisons Conference, with effect from the 15th January, 1939.

Lieutenant-Colonel R. Hay is appointed Deputy Director-General, Indian Medical Service, with effect from the 16th January, 1939.

Lieutenant-Colonel J. Findlay, on relief, resumed charge as Inspector-General of Prisons, *vice* Lieutenant-Colonel I. S. Nalwa, on the forenoon of the 27th January, 1939.

On return from leave Major W. Lawie has been posted as Civil Surgeon, Agra.

Major A. K. M. Khan to be Officiating Surgical Specialist, Karachi. Dated the 2nd December, 1938.

Major H. S. Smithwick returned from leave and resumed charge of the duties of Civil Surgeon, Sholapur, with effect from the forenoon of 4th January, 1939.

Major K. S. Fitch, on the expiry of his leave, is appointed to be Civil Surgeon, Burdwan, *vice* Lieutenant-Colonel N. C. Kapur, granted leave.

Reverted to Military

Major W. F. Cooper from Port Health Office, Bombay, on 30th December, 1938.

Captain F. W. Whiteman from Bihar, on 5th December, 1938.

The Secretary of State for India has appointed to the Civil Branch of the Indian Medical Service the following Officers of the Indian Medical Service, with effect from the dates stated against their names:—

Central Government

Captain G. F. Harris. Dated the 26th February, 1938.

Captain F. R. Cawthorn. Dated the 8th April, 1938.

Captain G. P. Charlewood. Dated the 17th April, 1938.

Major B. M. Rao. Dated the 13th June, 1938.

Madras

Captain W. P. Lappin. Dated the 20th January, 1938.

Captain B. A. Porrit. Dated the 4th February, 1938.

Captain J. White. Dated the 24th May, 1938.

Captain G. B. Thomas. Dated the 13th June, 1938.

Bengal

Captain J. Brehner. Dated the 27th December, 1938.

Captain W. M. Niblock. Dated the 7th January, 1938.

Captain P. I. Franks. Dated the 11th April, 1938.

United Provinces

Captain B. J. Griffiths. Dated the 10th January, 1938.

Punjab

Captain C. F. Garfit. Dated the 22nd January, 1938.

Captain G. W. Miller. Dated the 1st February, 1938.

Major V. E. M. Lee. Dated the 25th February, 1938.

Assam

Captain D. Tennant. Dated the 21st January, 1938.

Captain S. Shone, transferred from the Military Department to Civil employ, to act as Junior Specialist in Medicine, Government General Hospital, Madras, with effect from the date of taking charge, *vice* Captain J. White.

Captain R. L. Haviland-Minchin is appointed to the Medical Research Department on probation for 2 years, with effect from the 21st November, 1938 (forenoon).

Captain F. McD. Byrn to be Medical Officer, Lawrence Royal Military School, Sanawar. Dated the 25th November, 1938.

Transferred to Civil

Captain F. C. Leach, to C. P. and Berar, on the 6th December, 1938.

Captain R. L. Haviland-Minchin, an Officer of the Medical Research Department, is appointed to officiate as Assistant Director, Central Research Institute, Kasauli, with effect from the 16th December, 1938 (afternoon).

Captain B. L. Taneja to be D. A. D. P., Presidency and Assam District. Dated the 23rd December, 1938.

Captain C. J. Hassett is appointed to officiate as an Agency Surgeon, with effect from the forenoon of the 10th January, 1939, and is posted to the North-West Frontier Province.

Captain F. C. Leach, attached to the Office of the Civil Surgeon, Nagpur, for training, is posted as Superintendent, Mental Hospital, Nagpur, with effect from the 16th January, 1939.

Captain J. White is posted temporarily to Howrah as Civil Surgeon.

Lieutenant (on probation) D. S. Wilson is reinstated to the Establishment 1st November, 1938, with seniority, 1st May, 1938.

LEAVE

Lieutenant-Colonel N. C. Kapur, Civil Surgeon, Burdwan, is granted leave *ex-India* for 8 months, with effect from the 7th November, 1938, or from any subsequent date on which he is relieved.

Lieutenant-Colonel L. S. Modi, Officiating Inspector-General of Prisons, C. P. and Berar, has been granted leave on average pay for 4 months, with effect from the 3rd January, 1939, preparatory to retirement.

Lieutenant-Colonel I. S. Nalwa was granted leave from the 27th January, 1939, to the 19th March, 1939.

Lieutenant-Colonel J. Rodger, O.B.E., M.C., an Agency Surgeon, is granted leave for 5 months and 7 days, with effect from the afternoon of the 9th January, 1939.

Major E. M. Sewell, leave *ex-India* for 10 months, with effect from the 1st February, 1939, or date of relief.

Captain J. J. Barton, Staff Surgeon, Quetta, proceeded on 9 months' combined leave *ex-India*, on the 29th November, 1938.

Captain H. A. Ledger, Surgical Specialist, Karachi, proceeded on 10 months' combined leave *ex-India*, on the 2nd December, 1938.

PROMOTIONS

Lieutenant-Colonels R. V. Morrison and J. Findlay have been advanced to the higher position of their rank, that is to the list of Lieutenant-Colonels specially selected for increased pay for ability and merit, with effect from the 31st May, 1937, and 14th October, 1938, respectively.

Lieutenant-Colonels S. S. Sokhey and W. C. Spackman have been advanced to the higher position of their rank, with effect from the 28th August, 1938, and 16th October, 1938, respectively.

Major to be Lieutenant-Colonel

B. P. Baliga. Dated the 17th December, 1938.

Lieutenants (on probation) to be Captains (on probation)

C. W. Greene. Dated the 16th May, 1938, with seniority from the 1st January, 1938.

G. A. Graham. Dated the 28th September, 1938, with seniority from the 1st May, 1938.

D. McC. Black. Dated the 28th September, 1938, with seniority from the 1st May, 1938.

J. G. Fife. Dated the 28th September, 1938, with seniority from the 1st May, 1938.

N. D. Jekyll. Dated 28th September, 1938, with seniority from the 1st May, 1938.

J. H. Briscoe-Smith. Dated 28th September, 1938, with seniority from the 14th August, 1938.

A. C. Glendinning. Dated the 28th September, 1938, with seniority from the 31st August, 1938.

G. C. Retz. Dated the 12th October, 1938, with seniority from the 1st July, 1938.

A. R. Woodforde. Dated the 12th October, 1938, with seniority from the 18th July, 1938.

R. D. D. Birdwood. Dated the 1st November, 1938.

R. Passmore. Dated the 2nd March, 1938.

RETIREMENTS

Colonel G. R. Lynn, D.S.O., retired on the 1st December, 1938.

Colonel W. J. Powell, C.I.E., K.H.S., retired on 17th December, 1938.

Lieutenant-Colonel B. Gale, who was on leave till the 30th January, 1939, retired from service, with effect from the 31st January, 1939.

RELINQUISHMENT

Lieutenant (on probation) D. S. Wilson relinquishes his probationary appointment, 8th December, 1938.

Notes

TREATMENT OF ASTHMA BY ORAL INHALATION

THE symptomatic treatment of mild to moderate attacks of asthma by means of oral inhalation of adrenaline solution of a strength of 1 in 100 is described by Graeser and Rowe in their original article (*Journal of Allergy*, 1935, 6 : 415). These authors describe the results of a series of 40 cases, clearly demonstrating the value of inhalation of adrenaline by the mouth for the prompt relief of asthmatic attacks. In most instances, the physiological effect occurred more rapidly than with hypodermic injection of the 1 in 1,000 solution; it was rarely slower. The authors, indeed, are so satisfied with the results of their work, that they feel the inhalation procedure may, in many cases, well supplant the use of adrenaline hypodermically.

Patients are instructed to place the nozzle of the atomiser just within the open mouth and to inhale deeply while creating a spray. The amount of inhalation varies for each patient, depending on the severity of the symptoms and the manner in which the atomiser is manipulated. Some patients find it necessary to inhale until cough occurs before relief is obtained. Therefore no definite dose can be given, and patients must learn from experience to estimate their own requirements. The treatment, until individual needs are ascertained, should proceed slowly, allowing one or two minutes to elapse between several deep inhalations.

Side effects, such as nervousness and tachycardia, which frequently follow subcutaneous injection of adrenaline, are rarely caused by inhalation of the 1 in 100 solution. Several patients, so susceptible to these disturbances that doses as small as 3 to 4 minims caused discomfort, were able to use the inhalation method with success. Some moderate dryness of the throat was experienced in about 30 per cent of the cases, but that was mitigated by rinsing the mouth with water immediately following inhalation.

A preparation of the requisite strength for this treatment is now made available by Burroughs Wellcome and Co. as 'Vaporole' solution of adrenaline, 1 in 100. Any atomiser delivering a fine, evenly-distributed vapour may be used, but for effectiveness and durability, no better apparatus could be selected than the 'Paroleine' atomiser, which has a stainless

steel delivery tube and is of exceptionally robust construction throughout.

'Vaporole' solution of adrenaline 1 in 100 is supplied in amber glass-stoppered bottles of 5 c.cm.

CARDIAZOL-QUININE-KNOLL

CARDIAZOL-QUININE combines rapidity of action with the highest possible degree of tolerability. The purpose of the combination is to complement the action of quinine in all indications requiring circulatory support. The cardiazol component increases the solubility of the quinine salts very considerably which explains why absorption of the remedy is exceptionally rapid, why it remains in the organism a very appreciable length of time and why it is able to attain a high concentration in the blood. Relatively large amounts of quinine in pure watery solution can be lodged in the organism by cardiazol-quinine injections (cardiazol-quinine ampoules, without additions of urethane, essential oils, etc.). The slight viscosity of the solution ensures satisfactory tolerance of the injections, assists rapid absorption and thus hastens the action.

The chief indications for cardiazol-quinine are influenza, pneumonia, bronchitis, rhinitis, tracheitis, anginous states, tonsillitis, typhoid, malaria, and tuberculosis; also heart disorders such as conductivity disturbances, arrhythmias; hyperkinesia, hyperexcitability and tachycardia. It is of great value in the enforced pauses of digitalis therapy and indicated also in primary feebleness of labour, febrile abortion, to induce labour and abortion and for the prophylaxis and treatment of post-operative pulmonary complications.

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Original Articles

THE EXPERIMENTAL PRODUCTION OF SYNDROME OF EPIDEMIC DROPSY IN MAN

By R. N. CHOPRA, C.I.E., M.A., M.D., Sc.D. (Cantab.),
F.R.C.P. (Lond.)

BRIEFET-COLONEL, I.M.S.

Honorary Physician to the King

C. L. PASRICHA

MAJOR, I.M.S.

R. K. GOYAL

S. LAL

and

A. K. SEN

(From the School of Tropical Medicine, Calcutta)

MUSTARD oil or certain adulterants in mustard oil have been implicated in outbreaks of epidemic dropsy by several workers. The so-called mustard-oil theory of epidemic dropsy is one of the earliest theories advanced to explain the cause of the disease and its prevalence in certain areas where mustard oil is extensively used for cooking purposes. The outbreaks in such areas are restricted to people who use mustard oil. Their neighbours who do not use mustard oil generally escape from this disease.

Sarkar (1926) recorded the production of symptoms resembling epidemic dropsy in man after the consumption of oil which had been accidentally adulterated with argemone oil (local name 'sialkata' or 'katakarak' oil) and Kamath (1928) described an outbreak of epidemic dropsy in Ganjam district amongst people who do not use mustard oil and, in this outbreak, oil pressed from certain seeds, locally known as *odissimari* seeds, was implicated as an adulterant. These and similar reports did not receive the attention they deserved till the mustard oil theory was again revived by the recent experiments of Lal *et al.* (1937) in which symptoms resembling epidemic dropsy were produced in human volunteers who ate food cooked in certain samples of mustard oil which had been implicated in outbreaks of epidemic dropsy. A control series whose food was cooked in pure mustard oil remained healthy. Although these workers showed that certain samples of mustard oil when used for cooking food produced symptoms of epidemic dropsy, the nature of the substance responsible for the production of symptoms in the implicated oil was not determined. The subject was reinvestigated and a careful study of the literature generally and of the work done by Lal and his co-workers, particularly on the aetiology of epidemic dropsy, suggested further work on the part played by argemone oil in the production of this syndrome. A test for this oil was found in Stewart and Boyd's (1928) book of public health laboratory

practice. This test consists in the addition of concentrated nitric acid to the sample of oil in a test tube. The tube is shaken and a positive reaction for argemone oil is shown by the development of an orange-yellow to a deep orange-red colour in the nitric acid layer. This test is also given by Lewkowitsh and Warburton (1922).

Positive reactions for argemone oil were obtained in the majority of the samples of oils collected from houses where there had been outbreaks of epidemic dropsy. Samples of *odissimari* seeds were obtained and identified by Mr. R. L. Badhwar to be the seeds of *Argemone mexicana* from which argemone oil is expressed. In view of these findings, that mustard oils implicated in natural outbreaks of the disease gave well-marked positive reaction for argemone oil and that Kamath's oil from *odissimari* seeds was argemone oil, it was arranged to give food cooked in these oils to certain volunteers. In one group of five individuals the food was cooked in pure mustard oil (expressed in the laboratory) to which was added known quantities of argemone oil (also expressed in the laboratory) from the seeds of *Argemone mexicana*. Another group of four individuals had their food cooked in samples of mustard oil implicated in natural outbreaks of the disease and which gave a positive reaction for argemone oil. A third group of individuals received a similar diet cooked in mustard oil which did not give a reaction for argemone oil. This last group showed no ill effects. The results obtained in the other two groups are summarized in tables A and B.

In one subject in each group there was transitory diarrhoea. In the group in which oil containing argemone oil was used for cooking, granular or hyaline casts were found in the urine of three of the five individuals but without any demonstrable albumin. In this connection it may be noted that granular casts were found in the urine of 7 of 16 individuals suffering from the naturally acquired disease.

Two individuals, one in each group, complained of dimness of vision but when examined showed no evidence of glaucoma.

Two of the four individuals whose food was cooked in incriminated oil developed cedema of the legs. In one the use of incriminated oil was stopped owing to intercurrent fever. In the fourth subject, although the incriminated oil was used for 21 days, there were no ill effects. This individual was the only non-Bengalee of the series and ate a limited amount of rice, eating instead bread (in the form of *chapaties*).

All the five individuals whose food was cooked in mustard oil containing known quantities of argemone oil developed well-marked cedema. Two of them (A 3 and A 4) in addition showed well-marked flush and cardiac symptoms (dilatation and murmur).

Food cooked in oil containing 5 per cent argemone oil was apparently relished by all, but the food cooked in 10 per cent argemone oil soon led to loss of appetite.

TABLE A

The results of taking food cooked in mustard oil containing known quantities of argemone oil. The argemone oil was expressed from Argemone mexicana seeds and mixed in proportion of 2 to 10 per cent with pure mustard oil (expressed from mustard seeds). Two ounces of this oil was used for cooking the daily food of each individual

	1	2	3	4	5
Age, weight	30 years, 89 lb.	31 years, 91 lb.	35 years, 125 lb.	45 years, 108 lb.	24 years, 113 lb.
No symptoms for	8 days	8 days	7 days	8 days	6 days
Early symptoms—					
(1) Lack of appetite	(1) 9th day	(1) 9th day	(1) 8th day	(1) 9th day	(1) 4th day
(2) Aches and pains	(2) 13th day	(2) 12th day	(2) 9th day	(2) 11th day	(2) 7th day
The use of oil containing argemone oil stopped on	14th day	14th day	14th day	14th day	8th day
Œdema appeared on	26th day	32nd day	21st day	21st day	15th day
Œdema lasted for	10 days	4 days	42 days	40 days	14 days
Flush appeared on	No flush	No flush	Slight flush on 26th day lasting 31 days.	Well-marked flush on 23rd day lasting 33 days.	No flush
Heart symptoms	Nil	Nil	Systolic murmur on 27th day lasting 4 days.	Systolic murmur on 27th day lasting 5 days.	Nil
Recovery in	10 days	4 days	42 days	40 days	Later influenzal pneumonia.

TABLE B

The results of taking food cooked in mustard oil collected from houses where there had been outbreaks of epidemic dropsy. This oil gave a positive reaction for argemone oil and was estimated (colorimetrically) to contain about 5 to 10 per cent of argemone oil. Two ounces of the 'incriminated' mustard oil was used for cooking the daily food of each individual

Subjects	1	2	3	4
Age, weight	20 years, 113 lb.	40 years, 118 lb.	40 years, 101 lb.	32 years, 96 lb.
No symptoms for	12 days	No symptoms developed in this individual	13 days	No symptoms developed in this individual.
Early symptoms—				
(1) Lack of appetite	(1) 19th day	Nil	(1) 19th day	Nil
(2) Aches and pains	(2) 19th day		(2) 19th day	
The use of incriminated oil stopped on	21st day	13th day*	21st day	21st day
Œdema appeared on	22nd day	..	22nd day	†
Œdema lasted for	13 days	..	10 days	..
Flush appeared on	No flush	..	No flush	..
Heart symptoms	Nil	..	Nil	..
Recovery in	13 days	..	10 days	..

*The use of 'incriminated' oil in this patient was stopped early owing to the development of intercurrent fever.

† Although this individual took the full amount of incriminated oil no symptoms developed. The diet of this subject (a non-Bengalee) differed from the diet of all others in that the intake of rice was limited and he took bread (as *chapaties*) once a day.

It appears that the principle or principles present in argemone oil have a cumulative effect, and, provided sufficient quantity of the oil is consumed, symptoms appear after an interval, even though the consumption of argemone oil or incriminated oil is stopped (see A 5). The oil used at the time of an outbreak can be pure and innocuous but it is the oil used some days before the onset of symptoms which is responsible.

Argemone oil is definitely more toxic to laboratory animals than mustard oil and various other bland oils. When argemone oil is heated to a stage when it 'fumes' well (at 240°C. for about 15 minutes) the oil (although it still gives a positive nitric acid test) is not toxic to animals. The toxic constituents are either destroyed or evaporated at this temperature. Heating at 100°C. or 150°C. has no appreciable effect in its toxicity to animals. Experiments are in progress to determine whether the toxic substance is present in the distillate or is destroyed at a temperature of 240°C.

The outstanding facts established by these experiments are—

1. Argemone oil when present in oil used for cooking gives rise to certain symptoms. The most marked effect is oedema of the legs and in some the development of a generalized flush and cardiac involvement. Similar symptoms are produced by the use of mustard oil implicated in outbreaks of epidemic dropsy and which gives a positive reaction for argemone oil.

2. Whether the condition produced is identical or not with the naturally-occurring epidemic dropsy cannot be definitely said at present, but there is no doubt that the use of oil containing argemone oil is harmful to man. There appears to be little doubt that consumption of adulterated oil produces symptoms which cannot be distinguished from those encountered in the naturally-occurring disease.

3. From the evidence available it appears that the adulteration of mustard oil with argemone oil may or may not be intentional on the part of those who grow the mustard plant, or of those who express or sell the oil. The plant *Argemone mexicana* is widespread, its seeds bear a superficial resemblance to mustard seeds and may be harvested along with them. It is possible that, because oil can be obtained from the seeds of this plant, efforts are not made to exclude these seeds in the harvesting of mustard seeds.

4. An oil containing argemone oil can be rendered harmless provided the oil is heated well. This is based on animal experiment and awaits confirmation by careful observations in man.

5. The plant *Argemone mexicana*, because of the ill effects produced in man by the oil expressed from it, must be considered as one of the poisonous plants of India. This plant is found widespread in mustard fields.

(Continued at foot of next column)

ERADICATION OF *HYMENOLEPIS NANA* INFECTION

By P. A. MAPLESTONE, D.S.O., D.Sc., M.B., B.S., D.T.M.
and

A. K. MUKERJI, M.B.

(From the Helminthological Research Department,
School of Tropical Medicine, Calcutta)

INFECTION with the dwarf tapeworm (*Hymenolepis nana*) is cosmopolitan and by no means uncommon, particularly in tropical and sub-tropical countries, but it rarely gives rise to symptoms which possibly accounts for the fact that efficient treatment of this condition never appears to have attracted a great deal of attention.

Consultation of the standard books on tropical medicine and parasitology reveals the fact that most of the usual anthelmintics (flox mas in some form or other, oil of chenopodium, thymol, hexylresorcinol and carbon tetrachloride) are all casually referred to by one or other author as being effective, but no detail is given. One of the most remarkable things about this subject is that in the sections devoted to treatment no book comments on the peculiar life history of this worm, and it is tacitly assumed that if a single dose of the chosen anthelmintic is given and no worms or eggs are found in the stool a day or two later the case is cured.

The main point of importance in the life history of this worm is that it does not need an intermediate host, and that once infection is acquired the eggs hatch in the intestine and the embryos enter the submucous coat of the intestinal villi where they grow and emerge into the lumen of the gut, reach maturity, deposit more eggs some of which hatch in the gut, and the cycle continues indefinitely. Also, on account of this characteristic of auto-infection, a single egg ingested in the beginning may eventually

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Summary

It has been shown by feeding experiments in man that the oil expressed from the seeds of *Argemone mexicana* can produce signs and symptoms of epidemic dropsy.

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give rise to a heavy and ever-increasing infection as generation succeeds generation. The time this cycle takes to be completed is of importance with regard to treatment, because an anthelmintic that will act on the worms in the intestinal canal, where it reaches the adult worms in relatively high concentration, is not likely to have much effect on the developing cysticercoids in the submucous layers of the villi as the objective in treatment with the toxic anthelmintics enumerated above is to get rid of them as rapidly as possible by evacuation of the bowels before they have time to be absorbed in any considerable amount.

A great deal of work has been done and much controversy has taken place on the identity of *H. fraterna* of mice and *H. nana* of man. Without entering into this controversy it may be stated, for the purpose of this paper, we consider it probable that *H. nana* in man and a fully adapted strain of the morphologically identical worm in mice have very nearly the same life history regarding the time of development of the various stages, length of life of the adults, etc. Shorh (1933) working with mice found that the length of life of adult worms does not exceed 25 days, and Hunninen (1935) observed, in a series of 36 mice, that one first showed eggs on the fourteenth day after swallowing eggs, 34 between the fifteenth and nineteenth days, and one on the twenty-fifth day. The latter worker also found that the cysticercoids began to return to the intestine from the villi 102 hours after entering them and that all had regained the gut by 144 hours (six days). He also noted that daily examination often fails to reveal eggs for periods of three or four consecutive days during the course of an infection; this is explained by one generation of adults having all died before the members of the next generation have reached sufficient maturity to begin depositing eggs.

If these accurately determined figures are applied to the problem of the treatment of *H. nana* infection in man three periods are found which must be taken into consideration in deciding if any course of treatment has been effective and a cure established: (1) Treatment must be continued for at least six days, (2) a negative period of at least five days is necessary before it can be said an infection has been eradicated, and (3) at least twenty-five days must elapse after cessation of treatment before a cure can be definitely claimed.

It is not possible to give any of the above drugs with safety over a period of several days, therefore none can be regarded as suitable for the treatment of *H. nana* infection. Kutschinsky (1933) apparently appreciated this fact for he records treating five cases with osarsol (stovarsol) tablets (dose not given) twice daily for three days. The summary of this paper in the *Tropical Diseases Bulletin* from which this information was obtained is very brief and it is said that in two cases there was temporary absence of eggs for about four months, and in

the other three complete disappearance of eggs. In the light of the above observations noted on mice, four months seems an unduly long time for an infection to remain latent and suggests that the method of egg demonstration used was not very effective so that if the infections were reduced in severity but not cured the eggs were missed until they had again become numerous. This idea is to some extent borne out by our experience recorded below in which stovarsol was found to be ineffective.

A female child, aged 2½ years, was admitted to hospital with 'debility' but no special symptoms. Eggs of *H. nana* were found in the stool at the routine stool examination and she was given stovarsol 1 grain three times a day for three days without apparent effect on the parasites. Six days later a dose of 1.5 c.cm. of filmaron oil (a proprietary preparation containing filicin combined with castor oil) was given and the stool was negative for *H. nana* the following day. The child was discharged and no more is known of it but it can be stated that the worms were resistant to stovarsol for three days and disappeared after a single dose of a male fern preparation. Whether it was cured or not is of course unknown.

A second child aged 10 years was given 2 grains of stovarsol three times a day for three days and continued to pass *H. nana* eggs daily for a week afterwards. The course of stovarsol was repeated and the infection was still present three days later.

These complete failures of stovarsol led us to consider that Kutschinsky's claims were not correct and that it was not worth while continuing with this form of treatment.

The somewhat similar life history of *Strongyloides stercoralis* and *H. nana*, as far as auto-infection of the host is concerned, suggested trying gentian violet because de Langen (1928) and Faust (Editorial, 1930) have shown, and we have confirmed their work in several unpublished cases, that gentian violet is successful in eradicating strongyloides.

Beginning on the fourth day after cessation of treatment the second child, noted above, who still harboured *H. nana* after two courses of stovarsol, each for three days, was given three half-grain doses of gentian violet a day for three days. The stool became free from *H. nana* eggs the day after treatment stopped and was free for the two succeeding days. This case was not observed further.

The rapid effect of gentian violet in this case indicated that it was worth further trial, and the protocols given below are a complete record of our results to date.

To avoid repetition, it may be stated that the gentian violet was given always in hard gelatin capsules, and the absence of *H. nana* eggs from the stools was determined by direct centrifugal flotation. All the patients were treated as inpatients.

Case 1.—Male, *æ*t. 30. Admitted into hospital for diabetes.

Ascaris, trichuris and *H. nana* infections found at the routine stool examination.

Given 16 grains of hexylresorcinol in capsules and all three infections persisted.

Given gentian violet 1 grain, *t.i.d.*, for five days. *H. nana* eggs disappeared the day after treatment stopped and were still absent eight days later. No further observation.

Case 2.—Male, *æ*t. 26. Admitted with pellagra.

Hookworm, ascaris and *H. nana* eggs and strongyloides larvæ found at the routine stool examination.

Given oil of chenopodium 1 c.cm. and tetrachlorethylene 4 c.cm.

Next day gentian violet 1 grain a day, *t.i.d.*, for six days begun.

Two days after cessation of treatment a few hookworm eggs only were found and a stool culture put up on the same day exhibited hookworm larvæ only, when extracted a week later.

The oil of chenopodium may have played some part in causing the disappearance of the *H. nana* infection. The time of observation was much too short to say if the case was cured.

Case 3.—Male, *æ.t.* 5. Admitted for 'diarrhœa'.

Ascaris eggs found at routine stool examination.

Given two treatments ten days apart, each of santonin $\frac{1}{2}$ grain and oil of chenopodium 5 minims.

Examination after second treatment showed ascaris infection to be cured but *H. nana* eggs were found for the first time in the final examination. This was a light infection.

Gentian violet $\frac{1}{2}$ grain twice daily for six days was ordered.

Vomiting troublesome so gentian violet discontinued after one day's treatment.

Gentian violet resumed after two days and vomiting recurred so further treatment was abandoned.

Four days after treatment was stopped no *H. nana* eggs could be found in the stools.

This case was not observed longer and as the stools were negative for *H. nana* eggs at several examinations prior to treatment evidence of the value of gentian violet in this case is not conclusive.

Case 4.—Male, *æ.t.* 32. Admitted for 'diarrhœa'.

H. nana infection found at routine stool examination.

Gentian violet 1 grain, *t.i.d.*, for six days ordered.

Complained of nausea so treatment stopped after four days.

No *H. nana* eggs in stool for three days after cessation of treatment.

Case 5.—Male, *æ.t.* 8. Admitted for oriental sore.

H. nana infection found at routine stool examination.

10th January. Gentian violet $\frac{1}{2}$ grain, *t.i.d.*, for seven days given.

12th January to 4th February (24 days). No *H. nana* eggs found and examination discontinued, and the case was considered cured.

As patient was still in hospital his stool was again examined on 8th March and found positive.

Gentian violet $\frac{1}{2}$ grain, *t.i.d.*, for seven days was repeated.

Stool negative from end of treatment for seven days, when eggs reappeared.

No more treatment was given for about a month.

7th May. Gentian violet $\frac{1}{2}$ grain a day, *t.i.d.*, for three days.

Stool negative for three days only.

14th May. Gentian violet $\frac{1}{2}$ grain, *t.i.d.*, for three days.

16th and 17th May. No *H. nana* eggs in stool.

18th May. Eggs again present.

Discharged from hospital and treated as an outpatient.

21st May. Gentian violet $\frac{1}{2}$ grain a day, *t.i.d.*, for three days.

3rd June. One egg found.

18th July. No eggs found.

20th August. No eggs found.

This case is the most instructive of the series as it indicates that a period of 24 days in which *H. nana* eggs cannot be found is not sufficient for establishment of cure. As examination was not carried out between the 25th and 56th days after becoming negative it is not possible to say the exact day on which infection again became manifest.

Another point of interest is that a period of three days' treatment appears to be as effective as one of seven days.

Case 6.—Male, *æ.t.* 13. Admitted with malaria.

Hookworm and strongyloides infection found at routine stool examination.

Treated with tetrachlorethylene and cured of hookworm infection.

Gentian violet $\frac{1}{2}$ grain a day, *t.i.d.*, for seven days.

Post-treatment stool examination showed *H. nana* eggs present.

Strongyloides disappeared from the stool after the third day of treatment and was never found again, even on culture of stool at the end of the period of observation two months later.

Eggs of *H. nana* disappeared after 4th day of treatment and reappeared again 17 days later.

Gentian violet $\frac{1}{2}$ grain, *t.i.d.*, for seven days repeated.

Eggs not present from 4th day of treatment until seven days after treatment stopped (11 days negative). Patient discharged.

A stool brought 18 days after discharge was positive.

Further treatment was refused.

Case 7.—Female, *æ.t.* 37. Admitted with *T. saginata* infection and *H. nana* found at once.

Gentian violet 1 grain, *t.i.d.*, was ordered but as the woman had a considerable amount of nausea and vomiting the usual course was modified as follows:—

First day. One dose only, on account of nausea.

Second day. Three doses, vomited third dose.

Third day. Three doses, nausea and vomited once.

Fourth day. Three doses given concurrently with 15 grains of bismuth carbonate and vomited in the night.

Fifth day. Vomiting continued so treatment stopped.

The *T. saginata*, snapped approximately two inches from the head, was passed two days after treatment stopped. Four days after cessation of treatment with gentian violet a dose of 4 c.cm. of tetrachlorethylene was given but no worm was found.

Signs of *H. nana* infection disappeared on the last day of treatment and the stool remained free from eggs until the woman was discharged from hospital—negative period 23 days.

This woman was treated with carbarsone for 10 days for chronic amœbiasis, beginning one week after cessation of gentian violet.

Gentian violet was given before tetrachlorethylene to see if it had any action on *T. saginata* as well as on *H. nana*. Although it failed to eradicate the large tapeworm the drug appears to have some effect on it because just after treatment stopped the major portion of the worm was spontaneously evacuated and it was found that in the gravid segments the uterus was deeply stained, although the remainder of the tissue was the usual dull-white colour. Higher up in the chain the sexually-mature segments did not appear stained at all.

Case 8.—Male, *æ.t.* 30. Admitted for filariasis with febrile attacks.

H. nana discovered at routine stool examination.

26th April. Gentian violet 1 grain, *t.i.d.*, for three days ordered.

27th April. Three doses given but nausea and vomiting later in evening.

28th April. Gentian violet omitted. *H. nana* eggs still present.

29th April. Three doses given and retained, some nausea. Stool negative.

30th April. Three doses given and retained, some nausea. Stool negative.

1st May. Vomiting began after second dose so no more given.

3rd May to 30th May. Stool examined daily, no eggs seen.

2nd June. One *H. nana* egg seen.

3rd June to 2nd July. No eggs seen; discharged.

Case 9.—Male, *æt.* 42. Admitted for diabetes.

H. nana eggs found at routine stool examination.

Three courses of gentian violet were given, each consisted of 1 grain, *t.i.d.*, for three days with intervals of four days between them. There was no apparent effect on the infection which persisted throughout, and there was no nausea and vomiting so all the drug was retained. This seems to be an unusually resistant case.

Case 10.—Male, *æt.* 4. Admitted with 'dysentery' not confirmed by bacteriological or protozoological examination, and there is no evidence the symptoms were caused by *H. nana* because they cleared up before treatment was commenced.

H. nana and trichuris eggs found at routine stool examination.

7th to 9th September. Gentian violet $\frac{1}{2}$ grain, *t.i.d.*

12th September. No *H. nana* eggs seen.

14th to 16th September. Gentian violet $\frac{1}{2}$ grain, *t.i.d.*

17th to 21st September. No eggs seen.

21st to 23rd September. Gentian violet $\frac{1}{2}$ grain, *t.i.d.*

22nd September. *H. nana* eggs again present.

No more eggs were seen up to the 1st October when patient was discharged. There was no vomiting throughout the treatment.

It will be seen that this case became negative after the first course of treatment, but it was decided to give two more courses of the same duration as in case 9. On the second day of the third course eggs again appeared which indicates the advisability of giving more than one three-day course even if the stool is negative after the first course.

Case 11.—Male, *æt.* 4. Admitted with 'dysentery' not confirmed by bacteriological or protozoological examination, and not caused by *H. nana* infection which was found at routine stool examination.

22nd to 24th December. Gentian violet $\frac{1}{2}$ grain, *t.i.d.*

26th December to 4th January. No *H. nana* eggs seen.

5th January. Eggs and segments of *H. nana* found.

6th to 8th January. Gentian violet repeated.

9th to 19th January. No eggs seen.

20th January. Eggs again present.

21st to 23rd January. Gentian violet repeated.

Remained positive until discharged on 26th January.

This child never vomited so all the gentian violet given, was retained. The treatment varied slightly from that in case 10 because the second and third treatments were withheld until eggs appeared in the stools. This patient is still under observation.

Case 12.—Male, *æt.* 22. Admitted with *H. nana* infection but no symptoms. Gentian violet 1 grain, *t.i.d.*, for three days. No nausea or vomiting. Stool became negative three days after cessation of treatment and remained negative for three more days, after which the patient had to leave hospital. A stool brought for examination 17 days later contained *H. nana* eggs. This case is still under observation.

Conclusion.—These observations indicate that gentian violet is a valuable drug for treatment of *H. nana* infection, possibly the only one of any real value. Much more work is needed to decide whether a course of treatment for a week or longer or several courses of three days'

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THE COMPARATIVE VALUE OF OIL OF CHENOPodium AND TETRACHLOROETHYLENE AS ANTHELMINTICS FOR USE IN MASS TREATMENT

By K. P. HARE, M.B., B.S. (Lond.), L.M.S.S.A.

Medical Officer, Tingri Medical Association

and

S. C. DUTTA, L.M.P.

Assistant Medical Officer, Itakhooli Tea Estate

Introduction

THE problem of hookworm infection bears several aspects of interest to the tea estate medical officer. From the clinical point of view of the practising physician, severe ankylostomiasis, though not an everyday occurrence, is a potent source of serious and, sometimes, fatal illness. 'Water-sore' or ground-itch, though not serious, is a very common disability which occurs during the summer months when the labour force is required to be at the peak of efficiency and when the physician is already busy dealing with the seasonal influx of cases of malaria and pneumonia. From the public health point of view of the medical officer, as

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duration at weekly intervals will prove to be the best. The interrupted form of treatment instead of a continuous course of six or seven days was tried on some of our cases in an effort to avoid the nausea and vomiting which is fairly common with this drug.

As far as our work goes the case records indicate that the minimum period of observation for a stool to be continuously negative is over 24 days, and hence is probably not far from the estimate based on the work of Shorb and Hunninen, quoted above. It is suggested that until further information on the subject is available this period should be placed at one month at least, but even a longer time than this is preferable until exact figures are obtained.

The results recorded are admittedly incomplete, and they are published with the hope that other workers, who have the opportunity, may be induced to follow the work up on the lines indicated in this paper.

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administrator, hookworm infection bears the cardinal stamp of interest in that it is eminently preventable by the provision of effective sanitation which prevents contamination of the soil and therefore removes the infective larvæ out of reach of the coolies' feet.

Unfortunately, very few tea estates have yet been provided with any system of sanitation at all so that the only way of breaking the circle of infection is by rendering worm-free the infected members of the population. Now, from this point of view, one hundred persons each harbouring one worm are of far more serious import than one person harbouring a hundred worms; for the area of scatter of infection is so much greater. In the tea districts of Assam, probably ninety per cent of the adult population harbour hookworms though the large majority of infections are very light so that, effectively to break the infectivity circle on its human side, virtually mass anthelmintic treatment is required.

The choice of anthelmintic is, therefore, a matter of some importance. For use in mass treatment, an anthelmintic must be:—

- (1) Non-toxic.
- (2) Reasonably palatable.
- (3) Easily dispensed.
- (4) Effective in one dose.
- (5) Inexpensive.

The fourth requirement is important as every treatment given means the loss to the estate of one day of labour, a vital consideration when production costs must be kept down to the minimum. Most authorities, *e.g.*, Chopra (1936), assess the value of an anthelmintic by comparing the proportion expelled of the estimated total worm load with the results obtained from some standard anthelmintic. We feel that this method is unsatisfactory. Since it must be based on experiments on heavily infected cases the results do not necessarily apply to the cases of light infection whose importance we have stressed. The heavily infected cases can always be dealt with individually since they are few in number. We consider that when assessing the value of a drug for mass treatment purposes, the only effective method is the determination of the percentage of infected persons, taken at random, who are rendered worm-free by one dose of the drug under test. Since it may be taken as accepted that the Clayton-Lane method of direct centrifugal flotation is the most accurate means of diagnosing hookworm infection, we feel that to find a stool egg-free when subjected to this test may be regarded as proof that the person who passed it is worm-free, provided a sufficient interval has elapsed since the exhibition of the anthelmintic.

The drugs in general use for expulsion of hookworms are carbon tetrachloride, oil of chenopodium, and tetrachlorethylene. Carbon tetrachloride is far from being non-toxic and several fatalities have been reported following

its use even when reasonable precautions have been taken. It is not, in our opinion, a suitable drug for mass treatment. Oil of chenopodium is probably, at present, the most largely used anthelmintic, but it is costly and is very unpleasant to take. There is a large literature in existence testifying to its efficacy and it is discussed in detail in all the standard textbooks of tropical medicine. Tetrachlorethylene, though it has been in use for at least ten years, has not amassed a considerable literature and a perusal of several standard textbooks provided only a limited amount of information. Manson-Bahr (1935) does not mention it at all, nor does Majumdar (1938). Banerjee and Bhattacharya (1938) mention it as 'a most effective anthelmintic against hookworm' and quote Maplestone for mode of administration. Chopra (1936), however, fully discusses its chemical constitution, pharmacological action and toxicity, and gives references to six papers on the subject. He comes to the conclusion that 'the cure rate with tetrachlorethylene is probably slightly greater than with (carbon) tetrachloride' and that 'tetrachlorethylene would be a very safe drug to employ as an anthelmintic'.

Manson (1934) carried out an extensive comparison between tetrachlorethylene alone, oil of chenopodium alone and a combination of the two and concluded that, within the scope of his investigation (which did not include examination by 'DCF') 'tetrachlorethylene is a safe and reliable anthelmintic for general use' and that 'tetrachlorethylene in a dose of 4 c.cm. and mixed treatment . . . proved to be definitely the best methods of treatment for mixed helminth infections and for hookworm infections'.

Maplestone and Mukerji (1937) have recently published a further series of cases confirming their previously recorded favourable impressions of tetrachlorethylene. They used the DCF method so that their figures are more comparable with ours. What information is available indicates that tetrachlorethylene is reasonably non-toxic and is effective. It is certainly more palatable than oil of chenopodium, is not more difficult to dispense, and its cost per dose is definitely less. The present investigation is an attempt to compare the efficacy of single doses of oil of chenopodium and of tetrachlorethylene in order to satisfy our fourth requirement, namely, efficacy in one dose.

Material and technique

The experimental subjects were 188 consecutive coolie patients admitted for hookworm treatment to estate hospitals under the senior author's charge. They had been picked out at labour force musters as being anæmic, or lethargic, or badly nourished, and in every case the existence of hookworm infection was confirmed microscopically by the senior author, personally, before treatment was given. Alternate batches of a dozen or so were treated with

the two drugs. Seventeen cases were given twenty minims of oil of chenopodium. Eighty-four cases had thirty minims of oil of chenopodium and eighty-seven cases had four cubic centimetres of tetrachlorethylene. Of these, ninety-four chenopodium cases (94 per cent) and forty-six tetrachlorethylene cases (52 per cent) were treated personally by the junior author. The remainder were treated substantially according to the same technique which was as follows:—

All the patients were treated as in-patients in order to allow of close observation and in every case the medicine concerned was poured directly into the mouth and the patient instructed to open the mouth afterwards to ensure that the whole dose had been swallowed. In any case where the medicine was vomited, the dose was repeated after a few minutes. The doses were administered in the early morning on an empty stomach and no food was given until noon when milk and sago were allowed. The oil of chenopodium used was guaranteed to be of B.P. strength and the tetrachlorethylene was obtained from a reliable source. The total dose of oil of chenopodium was split up into separate portions of ten minims each shaken up in one ounce of fifty per cent magnesium sulphate solution and the separate doses were administered at intervals of one hour. The total dose of tetrachlorethylene was given at one time shaken up with two ounces of a saturated solution of sodium sulphate. On the fourteenth day after administration of the anthelmintic a second stool was obtained from each case and subjected to Clayton-Lane's method of direct centrifugal flotation (DCF) by the senior author personally. The results were assessed as follows:—

No eggs in whole area of cover-slip = absolute cure.

One, two or three eggs in whole area of cover-slip = partial cure.

Four to twenty eggs in whole area of cover-slip = improvement.

More than twenty eggs was classified as 'no cure'.

Though, for the reasons stated above, we only attach importance to absolute cures we have included the other assessments in order to simplify comparison of our results with those of other workers.

TABLE

OIL OF CHENOPODIUM (TWENTY MINIMS)

17 cases

Degree of cure			Number	Percentage
Absolute cure	..	..	Nil	..
Partial cure	..	..	1	5.9
Improved	..	..	Nil	..
Not cured	..	..	16	94.1

OIL OF CHENOPODIUM (THIRTY MINIMS)

84 cases

Degree of cure			Number	Percentage
Absolute cure	..	..	4	4.8
Partial cure	..	..	7	8.3
Improved	..	..	19	22.6
Not cured	..	..	54	64.3

TETRACHLORETHYLENE (FOUR CUBIC CENTIMETRES)

87 cases

Degree of cure			Number	Percentage
Absolute cure	..	..	42	48.3
Partial cure	..	..	23	26.4
Improved	..	..	9	10.4
Not cured	..	..	13	14.9

Table showing results of administration of single doses of anthelmintics.

Results

The results of the investigation are shown in the accompanying table where we state the number of cases treated with each preparation, the number found in each class of 'cure' at the second examination and the same numbers expressed as percentages of those treated. It is obvious from this table that for efficiency in a single dose, tetrachlorethylene is infinitely superior to oil of chenopodium and, other things being equal, is the drug of choice for use in mass hookworm treatment. Our results with oil of chenopodium are, frankly, disappointing and are much inferior to those of other workers. Our standard of cure may have been more severe but another fact of possible importance is that some certainly, and possibly many, of these coolies have been previously treated with oil of chenopodium and it may be that a condition of 'chenopodium-resistance' can occur. We have never heard of such a condition being described but it seems an interesting possibility.

With regard to toxicity, all the patients treated with tetrachlorethylene experienced a sensation of drunkenness (which they rather enjoyed) lasting an hour or so. One case, a debilitated female of eighteen, suffered from severe vomiting, giddiness and marked drowsiness. After cold had been applied to the head she recovered and was perfectly well by the evening. Her cardiac condition was normal.

The coolies were emphatic in their opinion of the palatability of tetrachlorethylene as compared with oil of chenopodium. They considered it to have a sweet taste and a pleasant odour and pointed out that it did not cause any burning sensation in the mouth. These points all contrasted strongly with oil of chenopodium which is, by no means, one of their favourite drugs.

Tetrachlorethylene is simple to dispense using the method of administration described and has the added attraction to the compounder that he need only dispense one dose as against several.

Tetrachlorethylene is extremely cheap in use. One pound, costing Re. 1-14-0, represents twelve fluid ounces or approximately 360 c.cm. corresponding to ninety doses. The cost per dose is, therefore, one-third of an anna. One pound of oil of chenopodium, costing Rs. 13, represents nineteen fluid ounces, or 304 doses, the cost per dose being two-thirds of an anna—exactly double the cost of tetrachlorethylene.

Conclusion and Summary

(1) Attention is drawn to the importance in prophylaxis, as distinct from treatment, of mass anthelmintic treatment directed against the hookworms, and the properties of the ideal anthelmintic are stated.

(2) The assessment of the comparative value of anthelmintics is discussed and reasons given for preferring an assessment based on percentage of persons cured rather than percentage of worms expelled.

(3) Carbon tetrachloride, oil of chenopodium and tetrachlorethylene are discussed from the point of view of their literature.

(4) An experimental investigation into the efficacy of single doses of oil of chenopodium and tetrachlorethylene, checked by examination of the stools by Clayton-Lane's DCF method fourteen days after exhibition of the anthelmintic, is described and the results tabulated.

(5) It is concluded that tetrachlorethylene is a superior drug for mass treatment to oil of chenopodium as it more nearly fulfils all the five requirements of the ideal anthelmintic.

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'M. & B. 693' (2—SULPHANILYLAMINO-PYRIDINE) IN APE MALARIA

By R. N. CHOPRA, C.I.E., M.A., M.D., Sc.D. (Cantab.),
F.R.C.P. (Lond.)

BREVET-COLONEL, I.M.S.

Honorary Physician to the King

and

B. M. DAS GUPTA

(From the School of Tropical Medicine, Calcutta)

In recent publications Chopra and Das Gupta (1938) and Das Gupta and Chopra (1938) have shown that certain sulphonamide compounds, namely soluseptasine and prontosil, have a definite action on *Plasmodium knowlesi* infection in *rhesus* monkeys, when administered in disproportionately large amounts as compared with human dosage. The reason for testing the activity of this new chemotherapeutic agent of the sulphonamide series on the same infection is to ascertain whether a relatively smaller dosage will prove effective in eradicating the infection. The daily dosage, as recommended for adults in various bacterial infections for which the drug is intended, is 4 to 8 tablets each containing 0.5 gramme of the compound. Considering the comparative weights of man and monkeys the dose for a monkey weighing 4 kilogrammes comes to 0.13 gramme. As previous experience has taught us that oral administration of drugs to monkeys is extremely difficult, we asked the manufacturers if they could make it suitable for parenteral administration. Accordingly they prepared an oily suspension of this compound, containing 0.5 gramme of the active ingredient in 2.5 c.cm.

Experiment 1.—Monkey (*Silenus rhesus*) weighing 4.184 kilogrammes was experimentally infected with *Plasmodium knowlesi*.

Date	Parasites per 1,000 leucocytes	Treatment	REMARKS
12-12-38	32,400	0.74 c.c. of the oily suspension = 0.15 gramme of the compound given intramuscularly.	
13-12-38	28,000	Do.	
14-12-38	4,200	Do.	
15-12-38	Very scanty.	Do.	Very scanty degenerating forms. Mono-nuclears with ingested hæmozoin pigment.
16-12-38	0	Do.	
17-12-38	0		

The blood was examined daily till the end of December 1938, thereafter once a week till the 24th February, 1939. No parasites have ever been found.

Experiment 2.—Silenus rhesus, 4.025 kilogrammes in weight. Experimentally infected with *P. knowlesi*.

Date	Parasites per 1,000 leucocytes	Treatment	REMARKS
16-1-39	1.600	0.5 c.c. of the suspension = 0.1 gramme intramuscularly.	
17-1-39	5.700	Do.	
18-1-39	Scanty	Do.	
19-1-39	0	Do.	Many pigment-bearing leucocytes.
20-1-39	Very scanty.	..	Very scanty parasites detected in thick films after prolonged search.
21-1-39	0		
22-1-39	0		

From 22nd January to 27th February thick films have been examined bi-weekly but the results were invariably negative.

Experiment 3.—Silenus rhesus, 4.420 kilogrammes in weight. Experimentally infected with *P. knowlesi*.

Date	Parasites per 1,000 leucocytes	Treatment	REMARKS
19-2-39	8.200	0.25 c.c. of the suspension = 0.05 gramme intramuscularly.	
20-2-39	16,800	Do.	
21-2-39	1,200	Do.	
22-2-39	Very scanty.	Do.	Very scanty parasites detected after long search in thick film.
23-2-39	0	Do.	
24-2-39	0	..	A few pigmented leucocytes.

Comments.—From the above experiments it is evident that, unlike prontosil and soluseptasine, this compound is capable of destroying the monkey plasmodium (*Plasmodium knowlesi*) in dosage which is even less than what is regarded as the proportionate dose for a monkey as compared with that of man. Moreover, the parasites once disappearing, after a 5-day course of treatment, do not appear again in the peripheral blood at least in sufficient numbers to be detected in thick films. This is different from what happens after treatment of *P. knowlesi* infection with atebirin. For it has been noted by the present observers (Chopra, Das Gupta and Sen, 1933) that although atebirin exerts a

(Continued at foot of next column)

CHEMOTHERAPY OF GONORRHOEA AND OTHER MINOR VENEREAL DISEASES WITH SULPHANILAMIDE COMPOUNDS—A CLINICAL STUDY

By R. V. RAJAM, M.B., M.S., M.R.C.P.
Venereal Specialist, General Hospital, Madras

P. N. RANGIAH, M.B., B.S.

Honorary Assistant Surgeon, Venereal Department,
General Hospital, Madras

and

Dr. (Mrs.) T. MASILAMANI, M.B., B.S., D.G.O.

Honorary Assistant Surgeon, Venereal Department,
General Hospital, Madras

It is fairly evident now from the numerous reports of investigators that the sulphanilamide compounds are a distinct and invaluable addition to our therapeutic armamentarium in the fight against coccal and bacterial infections. Following on its dramatic effect in meningococcal infection, it was but in the fitness of things that the drug should have been tried in the closely allied but much more widely prevalent gonococcal infection.

With the lead given by Dees and Colston (1937) in their preliminary report on 19 cases of gonorrhoea treated successfully with sulphanilamide, a number of clinicians, American and European, have given the drug a trial. From the many reports which have appeared and are still appearing, it seems fairly certain that we have in these compounds a potent chemotherapeutic agent in the treatment of gonococcal infection. But unfortunately the drug is definitely toxic and evidence is accumulating that serious and fatal results may follow the administration of the drug. The drug has been deemed to be a potential marrow poison with the ever imminent risk of inducing those often fatal blood dyscrasias, hæmolytic anæmia and granulocytopenia. Its very therapeutic potency

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very powerful action on this infection, the parasites almost invariably reappeared in 10 to 15 days and multiplied with the same rapidity as in the primary attack, causing the death of the animal if prompt treatment was not accorded. In view of the encouraging results obtained with this drug in monkey malaria, it is well worth trying on human cases.

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seems a disadvantage in that there is evidence that the drug is being indiscriminately administered or prescribed in all and sundry conditions from a common cold to epilepsy. In a disease like gonorrhoea, in which there is always a tendency on the part of the patient to avoid publicity and exposure, the comparative cheapness of this group of drugs under the cut-throat competition of rival manufacturing firms, the ease and the success of oral administration, and the absence of any restriction on their sale, afford ideal conditions for self-treatment with its very real dangers. The gonococcus being a purely human parasite does not lend itself to study in laboratory animals under controlled conditions. This is a great handicap in the experimental evaluation of the sulphanilamide group of drugs with reference to toxicity and therapeutic effectiveness. The exact mode of action of this drug is as yet undetermined. Bacteriologists are of opinion that the drug is but feebly bactericidal, and exerts its action by arresting the growth of bacteria (bacteriostatic). This bacteriostatic action of the drug may be of great clinical importance in two divergent ways :—

1. Under inadequate dosage and/or short duration of treatment, the drug may simply render the gonococci temporarily ineffective and avirulent, inducing a condition of precocious latency. Such latent carriers under a false sense of security will be a menace to the non-infected.

2. The organisms maimed and rendered effete by the drug may be completely destroyed in the body by the natural immunity mechanism. Thus, the chemotherapeutic action of the drug reinforced by the natural immunity reactions of the body explains the many permanent cures already reported in the literature.

The optimal dosage of the sulphanilamide compounds is still a matter of controversy. Long's biochemical studies, corroborated by those of Bannick and Low and others, seem to indicate that a concentration of 5 to 7 milligrammes of the drug in 100 c.cm. of blood is essential for therapeutic effectiveness. This concentration may be maintained by a daily dosage of 4 to 5 grammes with uniform spacing of the intervals between individual doses.

The clinical study attempted in this paper comprises mostly our observations on the chemotherapy of gonorrhoea. A certain number of other minor venereal diseases were also subjected to the treatment with sulphanilamide. All the cases of gonorrhoea that attended the venereal clinic, General Hospital, Madras, for the past nine months with few exceptions were treated with the new drug. Our cases include every type of gonorrhoea, acute, subacute, chronic, complicated, first attacks, and subsequent attacks. The majority of the patients were ambulatory.

Male cases

The diagnosis of gonorrhoea was based on a complete clinical and bacteriological examination. The nature of the discharge, the appearance of the urine by the glass test, the condition of the adnexal structures, and the presence or absence of complications were completely recorded before commencing treatment. The ambulatory patients were asked to report themselves daily during the period of treatment. Sulphanilamide or some other allied product was administered orally. The patients were given detailed instructions as follows :—

- (1) The tablets are to be taken with a glass of water after meals three or four times a day at regular stated intervals.
- (2) The patients are warned to avoid eggs, onions, garlic, saline purgatives, undue exposure to sunlight, and any form of strenuous exertion.

During the daily visits, every patient receiving sulphanilamide treatment was carefully gone through. Smears were taken for bacteriological examination, the urine was examined by the two-glass test, alleviation or disappearance of symptoms was recorded, and any toxic reaction noted.

In the majority of cases studied, the clinical response to sulphanilamide was dramatic. The urethral discharge ceased, and the urine became crystal clear with an occasional mucus shred, in 48 to 72 hours after commencing treatment. The symptoms of strangury, frequency and pain disappeared even quicker after the first day's treatment. There was a corresponding improvement in the bacteriological examination of smears and centrifuged deposit of the urine. By the end of the first week, the urethra was perfectly dry, the urine sparkling and clear, the smears showed only a few epithelial cells, an occasional pus cell in different stages of disintegration and the complete absence of gonococci. How futile, time consuming and nerve-racking, the older methods of treating gonorrhoea seem in contrast to sulphanilamide therapy. The doctor of 1950, by which time the chemotherapeutic treatment of gonorrhoea will have been standardized, will wonder at the ineptitude of his forbears with their multiple and uncertain methods of treatment, with weeks and months of irrigations, instillations, instrumentation, chemical dyes, and dubious vaccines.

The total number of cases of gonorrhoea treated in the department during a period of nine months was 737. Out of this number, only 439 cases are included for purposes of statistical analysis and evaluation in the present study. The remaining 298 cases defaulted after inadequate treatment, and hence are excluded from this survey.

The 439 cases consist of 343 cases of uncomplicated gonorrhoeal urethritis and 96 cases of gonorrhoea with complications.

Gonorrhœal urethritis (without complication)—
343 cases

Drugs used.—A number of drugs of the sulphanilamide group were under trial in the treatment of disease, as table I will show :—

daily dosage was tried to find the optimum dose compatible with the minimum of toxic reaction. An analysis of 96 cases of apparent cure treated with varying doses of sulphanilamide for about a week reveals the influence of daily dosage on the rapidity of response.

TABLE I

Drug administered	Number of cases treated	Number cured	Percentage cured	Number failed	Percentage of failures
1. Proseptasine (M. & B.)	25	4	16	21	84
2. Prontosil album (Bayer)	33	26	79	7	21
3. Uleron (Bayer)	10	7	70	3	30
4. Urea sulfazide (Union Drug)	20	8	40	12	60
5. Sulfanilamide (P. D. & Co.)	255	202	80	53	20
TOTAL	343	247	72	96	28

Though the results of the treatment of the infection with drugs 1, 2, 3 and 4 were based on a much smaller number of cases than with drug 5, we are of opinion that Sulfanilamide is much the most efficient, with Prontosil album running a close second. In our hands both Proseptasine and Urea Sulfazide have proved disappointing as may be gathered from the large percentage of failures in table I. As regards Uleron we have not been able to corroborate the claims put forward by German clinicians that it is therapeutically superior to sulphanilamide. The drug seems to be capricious in its action. In our limited experience with Uleron we found that bacteriological cure does not keep pace with the clinical cure and scattered gonococci, without pus cells and with staining abnormalities continue to be observed under the microscope even after apparent clinical cure.

Influence of daily and total dosage

A period of three weeks was fixed tentatively for the duration of sulphanilamide therapy and the drug was administered for three successive six-day periods with an interval of a day's rest between the courses. A number of scales of

TABLE II

27 cases received	22 per cent apparent cure in 3 days.
3 grammes daily	33 " " " " 5 "
with	45 " " " " 7 "
47 cases received	25 per cent apparent cure in 3 days.
4 grammes daily	50 " " " " 5 "
with	25 " " " " 7 "
22 cases received	68 per cent apparent cure in 3 days.
6 grammes daily	18 " " " " 5 "
with	14 " " " " 7 "

After the first week of treatment, a maintenance dosage of 2 to 3 grammes daily was administered in successful cases for the next two weeks.

The percentage of cures was studied with reference to the total dosage administered during the three-week period in 255 cases.

The results of statistical analysis of our cases seem to confirm the observations of other workers in the following points :—

- (1) An optimal daily dosage of 4 to 5 grammes of sulphanilamide during the first week of therapy is necessary for rapid clinical response.

TABLE III

	Failures	Percentage of failures	Cures	Percentage of cures
Total dosage below 40 grammes	49	26	141	74
Total dosage above 40 grammes	4	6	61	94

TABLE IV

Duration of disease	Number of successful cures	Percentage of cures	Number of failures	Percentage of failures
Under one week	30	59	21	41
One to four weeks	61	77	18	23
Beyond four weeks	54	93	4	7

- (2) A total dosage of 50 to 60 grammes of the drug, spread over a period of three weeks, gives the highest percentage of permanent cure of cases.
- (3) If a case of gonorrhœal urethritis does not respond by the end of the first week of massive therapy, it is futile to continue the administration of the drug during the subsequent weeks.
- (4) To avoid relapses and resistance the chemotherapy should be uninterrupted during the first week.
- (5) Smaller daily doses of 1 or 2 grammes, far from being beneficial, seem to make the infection more resistant and liable to induce complications like epididymitis and arthritis.

The rate of cure of gonorrhœal urethritis with reference to the duration of the disease was investigated in 188 cases and is shown in table IV.

The results of chemotherapy of gonorrhœal urethritis of less than a week's duration appear distinctly disappointing and lend support to the view, put forward by Cokkinis and his co-workers, that in cases of gonorrhœa of less than one week's duration, sufficient time has not elapsed for the body to develop the immunity mechanism to deal with the gonococci arrested by chemotherapy. Further, it is our impression that premature chemotherapy renders the infection more resistant and delays the development of the natural immunity mechanism. The marked improvement in the results of cases of one to four weeks and beyond four weeks' duration is evidence of the time taken by the body to develop its own resistance and to utilize effectively the drug circulating in the blood for the cure of the infection. In our study of cases of gonorrhœal urethritis of more than four weeks we have found that a less total dosage of the drug and a shorter period of treatment (two weeks) suffice to bring about cures in most of the cases. With the same object of assessing the value of chemotherapy in the first and subsequent attacks of gonorrhœa, 120 cases were studied of which 66 were first attacks and 54 were second, third and subsequent attacks. 79 per cent of the former and 93 per cent of the latter were recorded as cured.

Complications of gonorrhœa in the male— 96 cases

Table V gives the list of complications.

Gonorrhœal epididymitis—31 cases

TABLE VI

Number of cases treated	Drugs employed	Results regarding epididymitis and urethral infection
20	Sulfanilamide	All the cases cured—both epididymitis and urethral infection.
4	Urea sulfazide	Three cases responded well to epididymitis—one case no response to epididymitis and urethral infection.
3	Proseptasine	All failed.
2	Prontosil album	Both the cases cured.
2	Uleron	One was a failure; the other was cured.

The response of epididymitis to treatment with sulphanilamide or its product was eminently satisfactory. The pain disappeared dramatically within 24 hours and the swelling completely subsided by the end of the week without even leaving a residual nodule at the lower pole of the organ, a common feature with the older methods of treatment. The associated urethral infection also was cured in the majority of the cases. No other local adjuvant treatment was applied to the scrotum except a mechanical support.

Joint affections

Thirty-one cases were treated of which 24 were admitted as in-patients. The results of treatment with sulphanilamide compounds of gonorrhœal joint affections were not as satisfactory as was expected. Though the response of the associated urethral infection was as good as in the other uncomplicated cases of gonorrhœa, the improvement of the joint condition was slow and erratic. The pain, swelling and limitation of movement subsided only slowly leaving at the end of a complete course of therapy, a degree of residual disability of pain and swelling, etc., which was annoying to the patient and disappointing to the doctor. Another distressing thing we noticed in the treatment of joints with sulphanilamide is that during the therapy, while the originally affected joint or joints were showing signs of improvement, other joints became consecutively or successively involved, a sort of Herxheimer reaction, which in their turn showed signs of abatement. This slow improvement in the condition of the joint with sulphanilamide prompted us to try a combination therapy with

TABLE V

Epididymitis	..	..	..	31	Perineal abscess and fistulæ	..	..	13
Joint affections	..	..	..	31	Prostatic abscess	..	..	1
Tyson's adenitis	..	..	..	3	Stricture urethra	..	..	12
Periurethral abscess	..	..	..	5				

very successful and rapid results. The combined therapy consists of pyrexia induced by dmeleos vaccine with oral administration of sulphanilamide. A course of six injections of dmeleos vaccine on alternate days and oral sulphanilamide produced rapid results. The pain and swelling subsided within a week or ten days and patients were enabled to move the affected joints within a fortnight. Now it is our routine practice to employ the combination therapy in all cases of gonorrhœa with joint complications.

Other complications

In prostatic abscess, cowperitis, periurethral abscess and Tyson's adenitis, sulphanilamide therapy was a distinct failure. These foci of infection had to be dealt with by other methods or surgically, before resorting to chemotherapy. It is our considered opinion that in adnexal infections the value of treatment with the drugs is dubious. In gonorrhœal urethritis complicated with stricture, of which 12 cases are reported, sulphanilamide had no appreciable effect either on the clinical condition or on the bacteriological findings. But preliminary dilatation of the stricture, followed by chemotherapy, resulted in a cure in most of the cases.

Adjuvant treatment

Daily urethral lavage with potassium permanganate lotion was employed in about two-thirds of the cases of gonorrhœa receiving sulphanilamide treatment. A comparison of the results of these cases with those of the other third who had sulphanilamide only without lavage has not convinced us of the necessity of local treatment. Good results were obtained in the latter in as much time as in the former. Medical practices are hard to die, however irrational or empirical they may be, and urethral lavage in gonorrhœa introduced by Janet is one of them.

It is hoped that with further improvement and standardization of the recent chemotherapy, the local or direct attack on the long-suffering urethral mucous membrane with a multiplicity of chemical irritants will be relegated to the limbo of forgotten or forbidden practices. An alkaline mixture was prescribed as a routine to every patient on sulphanilamide therapy, and was found to enhance the effect of the drug, induce diuresis and prevent or diminish the occurrence of the minor toxic reactions. Vaccines were not administered as part of the treatment to any of the patients receiving sulphanilamide, except as a provocative agent in assessing the permanency of cure in treated cases. Hence we have no opinion to offer regarding its value as adjuvant in the new treatment of gonorrhœa. The other additional methods, employed in the treatment of cases under review have already been mentioned under joint and other complications of gonorrhœa.

Standard and tests of cure

The apparently cured cases of gonorrhœa were passed through a number of tests before pronouncing them permanently cured.

- (1) A complete absence of urethral discharge—clear sparkling urine without threads, normal condition of the adnexa, negative bacteriological findings of the urethral scrapings, centrifuged deposit of urine, and the prostatic secretion, a week after all treatment was stopped.
- (2) Clinical and bacteriological examination after sounding and massage—three weeks after cessation of therapy.
- (3) Examination after provocation with vaccines (400 millions).
- (4) In some cases, the same tests were applied after provocation with alcohol or protected coitus or both together.
- (5) These tests were repeated after about six or eight weeks.

In only about 65 of our apparently cured cases could we carry out the repeated tests over a period of six to eight weeks, and declare them permanently cured. The rest of the apparently cured cases did not turn up as directed for examination. But it is presumed from a number of these latter patients who turned up with some other venereal infection weeks and months after their apparent cure and were examined for evidence of gonorrhœa with negative findings, that a large number of these cases remain permanently cured.

Relapses and failures

From among those cases of gonorrhœa who had three weeks' schedule of treatment and who were apparently cured no case of true relapse came under our observation. Regarding the failure of chemotherapy in a percentage of cases we have not been able to study them in detail. From the limited evidence available in our records we endorse some of the causes of failure put forward so cogently by Cokkinis and co-workers (1938). Among the causes of failure, insufficient dosage and early interruption of treatment rank foremost.

The third fruitful cause of failure in our series was the presence of adnexal infection and organic stricture of the urethra. Cokkinis (1937) writes of the existence of 'sulphanilamide prostate', a peculiar painless, smooth enlargement of the gland, as one of the important causes of failure. We have not been able to confirm his observation. Another cause of failure in our records was the existence of a positive Wassermann reaction without any clinical evidence of syphilis in a third of the unsuccessful cases. Whether the positive serology is a mere coincidence or has any inhibitory influence on the chemotherapy of gonorrhœa requires further elucidation. In many of the cases of gonorrhœa which failed to respond to sulphanilamide, we have been noting certain peculiarities in the microscopic picture of smears examined from them. The field shows a

large number of secondary organisms—staphylococci, streptococci and diphtheroids, a considerable number of pus cells with little or no phagocytic action and gonococci in extra-cellular clusters, or scattered over the field exhibiting an atypical morphology and aberrant staining reaction.

Toxic reactions

The toxic manifestations which appear in the course of treatment with sulphanilamide may be mild or serious. The mild reactions, being more common, occur in most of the patients receiving the treatment. The serious effects of therapy, particularly affecting the hæmopoietic functions of the bone marrow, seem to occur on a basis of individual idiosyncrasy, and to that extent are unpredictable. In the incidence of even the milder toxic reactions, there is a large element of capriciousness. Some patients go through the massive therapy of 50 to 60 grammes of the drug without being affected in any way; others show an alarming sensitiveness even after the first dose. Most of our patients complained of minor degrees of toxicity but were able to continue the treatment without mishap. Many of them seem to develop an acquired tolerance to the drug after the first few days. Persistence or recurrence of these mild toxic manifestations called for a halt in the therapy and a careful cytological examination of the blood. The milder manifestations noted in our records were varied and numerous: vertigo, headache, tinnitus, postural ataxia, nausea, disinclination for food, loss of the sense of taste, a sense of fullness in the stomach, mental inertia, inability to concentrate, mental confusion, frequent wet dreams, muscular asthenia. None of these symptoms interfered with the continuance of treatment. A minority of the cases complained of fever, vomiting, abdominal cramps, diarrhoea, paraesthesias, breathlessness on exertion and cutaneous lesions. No case of cyanosis was encountered. In those few cases of breathlessness a spectroscopic examination of the blood failed to reveal any abnormality. Many of these symptoms appeared towards the end of the third week of treatment. It is believed that the blood offers an index of toxicity and in 54 of the cases who exhibited a persistence of these symptoms an examination of the blood with particular reference to hæmoglobin red blood cells and white blood cells content was carried out. In five of these cases who had received a total of more than 50 grammes of the drug, the blood revealed a reduction of total leucocytes and a neutropenia. The drug was discontinued and examination of the blood a month after the cessation of the therapy showed a normal count. Among the drugs tried in our cases the administration of Uleron was conspicuous by the almost complete absence of the toxic reactions. No case of peripheral neuritis, as reported with Uleron by German and other writers, was recorded in our cases. Bannick and others (1938) observed that the same dose of

Uleron and sulphanilamide, when given to a patient, disclosed a low blood and urine concentration with Uleron, while a higher concentration in both appeared with sulphanilamide. This fact may explain the absence of toxic side effects with Uleron.

One case of fatal agranulocytosis occurred in our series.

A male, aged 32, was admitted with gonorrhœal urethritis of a fortnight's duration. Sulphanilamide was orally administered in the following doses:—

- 4 grammes daily for the first week.
- 3 grammes daily for the second week.
- 2 grammes daily for three days in the third week.

During the first week, the urethral infection did not show any improvement and smears and urine were still full of pus cells and gonococci. Towards the end of the week he developed multiple arthritis. The treatment was continued and as he looked ill and there was a slight icteroid tinge of the conjunctivæ towards the middle of the third week, sulphanilamide was stopped. The van den Bergh reaction was reported as 'direct positive delayed and indirect positive faint'. Next day, his temperature shot up to 105.6°F, and he looked extremely toxic. Blood count revealed: total white blood cells 1,500, with complete absence of granular leucocytes. In spite of the usual treatment with nuclein, glucose, etc., he developed signs of patchy consolidation of both lungs, went down hill and expired on the fourth day of illness. He had received 48 grammes of sulphanilamide up to the beginning of the illness.

To be forewarned in future, it is our practice now, after the fatal accident, to do complete cytological examination of the blood after the first week of therapy in all cases treated with one of these drugs.

Gonorrhœa of women and children

The number of women and children treated with sulphanilamide and analysed for the purpose of this study was comparatively small—54 women and 10 children—as the routine use of the drug was started only much later on the female side of the clinic.

The diagnosis of gonorrhœa was based on the finding of gonococci in one or other of the secretions with or without associated clinical signs or symptoms. The 54 women patients comprise 50 uncomplicated urethritis or cervicitis, two cases of acute salpingitis and two with multiple arthritis. The same daily dosage and duration of treatment were adopted as for male patients. Of the 54 cases, treatment had to be discontinued in seven cases on account of certain toxic reactions, and three cases proved resistant to therapy. The remaining 44 patients responded remarkably well to sulphanilamide. A clinical cure was attained in about a week or ten days and bacteriological cure in about a fortnight. No local treatment was given to the majority of the patients except a vaginal douche for the few who had profuse purulent discharge. After the cessation of treatment, most of the women continued to be clinically and bacteriologically negative even after vaccine and post-menstrual provocation; and many of them are still under observation. Three patients, probably of the prostitute class, after remaining negative

for eight to twelve weeks returned with recrudescence of discharge and positive smears, and are considered reinfections, as they confessed to coital exposure. The three resistant cases, on further investigation, were suffering from an associated skencitis. Cauterization of these ducts resulted in cure.

Other things being equal, women seem to be more sensitive to the toxic manifestations to sulphanilamide therapy. Of the seven patients for whom the treatment had to be discontinued three developed high fever, one severe diarrhoea, one peripheral neuritis, one epistaxis and one menorrhagia. All of them completely recovered from these ill effects, but the treatment was not restarted.

Gonorrhœal vulvo-vaginitis of children—10 cases

The ages of the children varied from 2½ to 12 years. The rapid therapeutic response and the remarkable freedom from even the minor toxic reactions were the two special features of sulphanilamide therapy in children.

Of the 10 cases, eight responded to sulphanilamide. One was cured with sulphanilamide and vaginal hormonal therapy and one, a girl of 7½ years, failed to respond even to a heroic total dosage of 54 grammes but was ultimately cured by oral hormone therapy. It was rather difficult to standardize the dose for children and we have erred on the side of excess. The daily dosage in our series varied from 1 to 2 grammes and the best results were obtained with a total dosage of about 15 to 20 grammes in children under six years and 20 to 25 grammes in children between six and 12 years. These apparently cured children are going through their weekly, fortnightly and monthly tests with negative findings. Some of them have been discharged as permanently cured and the rest are still under observation. Our experience with hormonal therapy of gonorrhœal vulvo-vaginitis in previous years was rather disappointing because of the very large percentage of bacteriological relapse after cessation of therapy. It is our impression that a combination of oral sulphanilamide with local hormone treatment will be the ideal method of attaining lasting permanent cures in this otherwise distressing and resistant infection of female children.

Chemotherapy of other venereal diseases

TABLE VII

	Number of cases treated with sulphanilamide
Non-gonorrhœal urethritis ..	24
Chancroids ..	23
Lymphogranuloma inguinale and genito-ano-rectal syndrome. ..	16
Venereal granuloma ..	4

The diagnosis of non-gonorrhœal urethritis was based on the presence of secondary organisms in the urethral smears and urine and repeated absence of gonococci. But most of these patients gave a definite history of antecedent gonorrhœa years ago. All the patients, except two, cleared up rapidly within a week and were free from signs and symptoms. The two resistant cases continued to have cloudy urine and burning on micturition even with massive doses of sulphanilamide for three or four weeks. Smears showed plenty of pus cells and organisms, particularly streptococci in chains. There was a pure growth of *Streptococcus viridans* on culture of the urine in both cases.

Chancroids

Hauschell's (1938) very favourable report on the treatment of chancroids with sulphanilamide induced us to try the drug in some of our numerous cases. Chancroids are fairly prevalent in the city of Madras; an average of 300 to 400 cases either alone or with some other venereal infection attend the clinic every year. Though classed as a minor purely-local infection among the venereal group they cause a lot of annoyance and are tedious to treat. Chancroids under a tight phimotic prepuce are liable to fuso-spirillary infection with rapidly spreading gangrenous ulceration. Old methods of treatment have been unsatisfactory and time consuming. Dmelcos vaccine for which a specific curative action was claimed has proved disappointing. Chancroids of less than two or three weeks' duration, do not respond to the vaccine, and infections of even longer duration are erratic in their behaviour to dmelcos therapy. Twenty-three cases of chancroids were treated with sulphanilamide; of these 21 were males and two females. Two cases had associated painful buboes. Oral sulphanilamide was given to these cases, in 4 grammes daily doses. The therapeutic result was remarkable. There was complete healing of the ulcers in 10 cases by the end of the first week, in eight cases including the buboes by the end of the second week. In three cases it took three weeks' sulphanilamide therapy to produce healing and in two other cases the treatment was a failure. In one of the unsuccessful cases there was a definite history of previous infection with syphilis though the serological reaction was negative. On the whole the results were very satisfactory and as in gonorrhœa it is expected that sulphanilamide bids fair to replace the older clumsy methods in the treatment of infections caused by the strepto-bacillus of Ducrey.

Lymphogranuloma inguinale and genito-ano-rectal syndrome

Sulphanilamide was tried as an experimental measure in 14 cases of lymphogranuloma inguinale in males, and two cases of genito-ano-rectal syndrome in females. Only three cases of the former responded well to treatment and the bubo

completely subsided in about two weeks. The treatment was a failure in other patients.

The drug was also tried as a desperate measure in four antimony-resistant venereal granuloma cases with complete failure.

Summary

1. A clinical report is presented based on our experience with sulphanilamide and its compounds in the treatment mainly of gonococcal infection and secondarily of other minor venereal diseases.

2. The best results are obtained with massive, potentially toxic doses of the drug for a minimum period of three weeks.

3. In gonococcal joint affections, a combined therapy of pyrexia and sulphanilamide seems necessary to attain rapid results.

4. The old-time local treatment of gonorrhœa does not, in our opinion, enhance the therapeutic effect of sulphanilamide.

5. Discontinuance of the drug is indicated in cases which do not show adequate response by the end of the first week; a rest interval and change to another drug of the same group often results in a cure.

6. Small dosage, premature therapy, interruption in the treatment and the presence of adnexal infections are the main causes of failure with sulphanilamide.

7. Uleron is the least toxic of the compounds used in the clinic but its capricious therapeutic action requires further study.

8. Sulphanilamide and prontosil album are the most therapeutically effective drugs of the series.

9. The minor toxic reactions of the sulphanilamide group of drugs seem inevitable and do not necessitate stoppage of treatment. A cytological examination of the blood at the end of the first week of treatment may help to forewarn against the more serious of the toxic manifestations. Persistence or increase in the minor toxic symptoms, severe gastric upset, breathlessness, abdominal cramps, high fever, peripheral neuritis and cutaneous lesions, call for cessation of treatment.

10. A fatal case of toxic agranulocytosis due to sulphanilamide is reported.

11. The results of the treatment of chancroids with sulphanilamide compounds are eminently satisfactory and those of other venereal diseases may be considered failures.

Conclusion

At present gonorrhœa is the most prevalent of the venereal diseases.

The strict parasitism of the gonococcus in man, is the single most important biological factor for its perpetuation and spread. Man has been fighting but a losing battle against its ravages, all these years. Its inevitable association with sex has further contributed to its comparative neglect as a social disease. Even in

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THE FAILURE OF SULPHANILAMIDE THERAPY IN THE TREATMENT OF COLIFORM AND GONOCOCCAL INFECTIONS OF THE GENITO-URINARY TRACT

By F. R. W. K. ALLEN, M.A., D.M.,
M.A.O. (Dublin Univ.), M.C.O.G.

Civil Surgeon

G. L. SHARMA, D.M.

Pathologist

I. B. BASU, L.M.P.

Surgical Registrar

C. M. JAMDAR, L.M.P.

Assistant Pathologist

and

K. B. PANSE, L.M.P.

House Surgeon

Mayo Hospital, Nagpur

CLAIMS have been made that coliform and gonococcal infections of the genito-urinary tract can be cured by the oral administration of certain drugs of the sulphanilamide group. It was decided to try out this method of treatment. Results have been disappointing and so it is considered desirable to report the results of those cases which could be kept under constant observation and strict bacteriological control. This accounts for the very small number of cases appearing in this communication.

Coliform infections

These were diagnosed and controlled by the aseptic collection of urine without the use of a catheter. Patients who would refuse to permit frequent collection of catheter specimens readily submit to the following method of control, which we have proved to be capable of yielding more sterile specimens than are usually obtained when a catheter is employed. In both sexes, the urinary meatus was thoroughly cleansed with either spirit or a 1 in 20 solution of Dettol in

(Continued from previous column)

the socially advanced countries of the world, where syphilis under modern treatment has tended towards a remarkable decrease, the incidence of gonorrhœa has not shown any decline. Whether the recent discovery of the sulphanilamide compounds is going to sound the death knell of the elusive gonococcus, time alone can reveal. But it may be accepted from evidence, so far available, that the synthesis of these potent chemotherapeutic products is as epoch-making as that of the organic arsenicals, 28 years ago.

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water. In males the prepuce was held back and in females the labia were held apart. The patient was then told to pass water and when the stream was flowing strongly a sterile jar was held to catch some of the stream. If the urine was acid, if pus cells were found in it, and if culture yielded a pure growth of coliform bacilli, the case was included in this classification.

Our series consists of eight cases, two males and six females. The two males had been operated upon by one of us (F. A.). In one a stone was removed from the right ureter and in the other an adenoma of the prostate was removed before the infection of the genito-urinary tract was attacked by means of sulphaphenylamide. The six females suffered from chronic pyelitis or cystitis. Two of them had already contracted phthisis. Skiagrams had been taken to exclude the presence of urinary calculi.

The urine was in every case kept alkaline during the administration of 3 grammes of sulphonamide-P or Prontosil album daily, divided into three doses, for seven days. No case was cured. In one of the females only did the drug appear to have any inhibitory effect on the organisms. None of our patients weighed more than 110 lb. and only two weighed over 100 lb., so that the dose of the drug would appear to have been adequate.

Gonococcal infections

These were diagnosed by the finding of Gram-negative diplococci in stained films of material taken from some part of the genito-urinary tract.

Our series comprises nine cases, three males and six females, all of whom were treated with Uleron.

One male had an acute anterior urethritis of ten days' duration when treatment was commenced. The other two males suffered from chronic anterior and posterior urethritis and chronic prostatitis. The six females all suffered from chronic cervicitis, only one of them was pregnant.

All the patients were under 110 lb. in weight. Each patient was given 3 grammes of Uleron daily, divided into three doses, for four days, as one course. An alkaline mixture was given with the Uleron. No other treatment was employed but the patients were kept at rest. One patient had six courses separated by intervals of one week, one patient had four courses and the remainder had three courses.

No patient was cured. While Uleron was being administered the gonococci disappeared from the films, but on the withdrawal of the drug the organisms re-appeared.

Our thanks are due to Messrs. Havero Trading Co., Ltd., Bombay, who, with great generosity, supplied us with a free sample of 640 grammes of Uleron. It is therefore a matter of deep regret that we are unable to report satisfactory results.

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INVESTIGATION INTO THE NATURAL BREEDING PLACES OF THE *SIPHUNCULINA FUNICOLA* FLY, IN ASSAM

By C. S. P. HAMILTON, D.S.O., M.R.C.S., L.R.C.P.

Introduction

THE reason for carrying out this investigation into the natural breeding places of the *Siphunculina funicola* fly is twofold. Firstly, because accurate knowledge of the life history of this fly is considered of importance, owing to its probable connection with the spread of diseases, such as epidemic conjunctivitis and possibly yaws, and secondly, because the eye-fly from April to October is a definite nuisance to everyone in this district.

For two years, up to the 24th March, 1937, the writer carried out an investigation, during his spare time, into the question of the breeding habits of the *Siphunculina funicola* fly in the area of the Juri Valley Medical Association, in the district of Sylhet, Assam (Hamilton, 1938) (Sylhet on the map is situated 24° 55' N.; 91° 59' E.).

On the 24th March, 1937, this research was started in earnest, as up to that time the investigation had produced no definite result. It was clearly realized that if it was hoped to obtain accurate information the research must be a very thorough and a continuous one.

Epidemic conjunctivitis

There seems little doubt that in this district epidemic conjunctivitis is a contagious disease, and that the contagion whether septic in origin or due to a specific organism, not yet discovered, is carried by the *Siphunculina funicola* fly, or eye-fly, by which name it is commonly known.

In this district we find the disease prevalent from March to the end of September. It is during the same period we find the eye-flies in their greatest numbers. The disease itself is a serious one, not only because of the discomfort and the great pain it causes to sufferers, but also because of the complications arising from the disease. Even amongst those treated we find an 'after complication' rate of 1.8 per cent to 1.9 per cent.

Further, it is a serious economic factor. Each sufferer must have an attendant, and the average number of days of attending hospital over a

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Our thanks are also due to Colonel D. H. Rai, I.M.S., Inspector-General of Civil Hospitals, Central Provinces and Berar, for permission to publish these results.

Note.—It is of course important to report failures as well as successes in treatment with new drugs for which claims are made. This series is, however, a small one and a 'mixed' one. Failures are sometimes due to the unsuitability of the cases treated or of the methods adopted, rather than to the inefficacy of the drug. Readers are referred to a note in our Current Topics section (p. 240) in which the reasons for the failure and apparent failure of Uleron in certain cases is discussed.—EDITOR, I. M. G.

series of 2,500 cases worked out at just over one week. In the tea industry, this disease occurs at the busiest period of the year, thus the loss of labour, at such a time, causes a good deal of inconvenience. In the year of drought in 1937, there were 2,227 separate cases of conjunctivitis in the Juri Valley from 1st March to 31st September. This figure will give an idea of how serious the problem may become.

Previous investigations

Evidence had been collected from casual observers, such as Indian clerks living in *bashas*, bungalow residents, and the labourers themselves, that the thatch of houses was the most likely breeding place of the *Siphunculina funicola* fly.

Some of the local inhabitants in the district considered this fly to be breeding in soil, others thought it might be in decaying vegetation or ammoniacal soil of cattle sheds. We know that in other districts there is scientific evidence incriminating certain of these breeding places.

Patton (1921), referring to work on the breeding habits of this fly carried out in 1914, stated that large numbers of these flies found on pieces of straw, string, cobwebs, etc., hanging from the roof of the leather factory at Saidapet, Madras, were placed in test tubes. Eventually, some of these flies laid eggs, and, from some of these eggs, adult flies were hatched out. It was then thought that, as the factory was situated close to a plantation of palmyra palms, and on the ground around these palms a number of palm nuts were found rotting, perhaps the *Siphunculina funicola* fly laid her eggs there, and that this was its natural breeding place. However, no egg, larva or pupa of the fly was found there. Patton goes on to say that recently in the Nilgiri Hills, larvæ simulating the eye-fly (*Siphunculina funicola*) had been found amongst decaying banana leaves, but that the fly had not been bred out from these larvæ.

Syddiq (1938) in Hyderabad reports finding the natural breeding place of the *Siphunculina funicola* fly, in that area, to be in contaminated soil. Strickland (1938) also states that Jepson and Pinto of the Ceylon Government Agricultural Service, bred the flies artificially on a variety of dead organic matter. D. N. Roy (1928) found that these flies were breeding naturally in earth of cattle sheds.

Present investigations

In this district we have found no evidence that the *Siphunculina funicola* fly breeds in damp or ammoniacal soil, in decomposing vegetation, or in manure of cattle or horses. We base this observation on the fact that, from the date 24th March, 1937, when this research was commenced, up to the time of writing this article, 1st November, 1938, we have examined hundreds of bottles of specimens and have never found the eggs, larvæ or pupæ of the *Siphunculina funicola* fly in any material except thatch grass. However, we have often found the young forms of

other varieties of flies in ammoniacal soil, and bred out adult flies from them. (The specimens examined included ammoniacal soil from cattle sheds, soil from latrines, and drains, decomposing vegetation, and soil found in galleries of ant heaps.)

Since . . . research, not only have we found *Siphunculina funicola* fly on many occasions in its young forms (eggs, larvæ, pupæ) in thatch, but we have succeeded in breeding out the adult fly from these young forms, and often on the original pieces of thatch they were found in, without the addition of any extra media; for purposes of hatching flies in connection with this research, we use a funnel which was suggested to us by Professor P. A. Buxton (Hamilton, 1938)

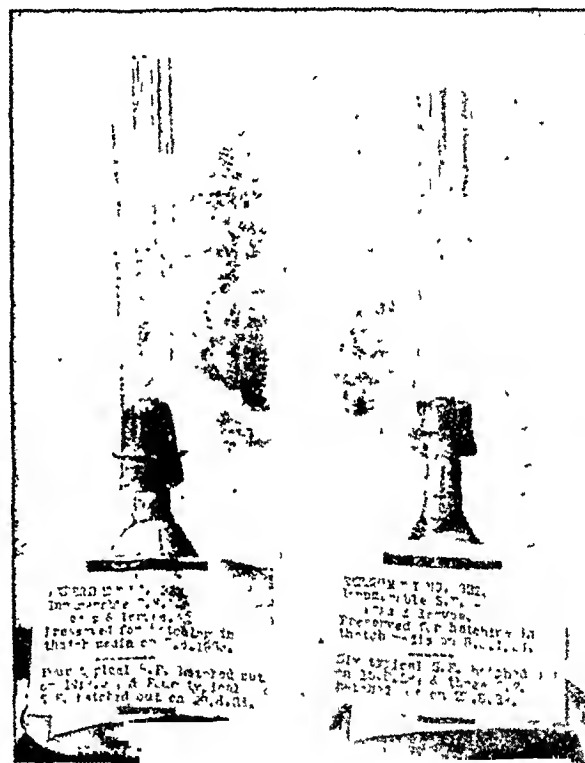


Fig. 1.—Showing funnels suggested by Professor Buxton for breeding flies from various media.

of the School of Tropical Medicine, London (see figure 1). Up to August 1938 we had only been able to breed a few adult *Siphunculina funicola* flies at a time, from various collections of eggs and larvæ found in thatch; the greatest number bred from a single specimen of thatch containing the young forms of this fly were nine.

The following important experiment was carried out on the 2nd February, 1938. A sample of ammoniacal soil was divided into two portions, one was boiled for one hour (actual boiling) and the other left unboiled: from the unboiled portion many flies were hatched out, none of these flies proved to be *Siphunculina funicola*. On the boiled portion we put six *Siphunculina funicola* eggs, found in thatch, and from these bred two *Siphunculina funicola* larvæ

and pupæ, eventually one adult *Siphunculina funicola* fly hatched out on 7th March, 1938.

Specimens of these flies were sent to the London School of Hygiene and Tropical Medicine, and our findings verified.

On 29th August, 1938, a few pieces of thatch were collected from a bungalow, and on these we found a number of *Siphunculina funicola* eggs and live larvæ. On this small collection of grass—seventeen live adult flies were bred out, and in addition three freshly hatched but dead ones were found in the tube. A few of these flies were sent to Professor Buxton and identified by him as *Siphunculina funicola*. These same flies were also sent to Dr. Curtis W. Sabrosky in the U. S. A. to be critically examined by him. He wrote to say that he had carefully compared them with the specimen from which de Meijere originally described the species and that he identified them as *Siphunculina funicola*. Dr. Sabrosky is accepted as the leading authority on the systematics of the *Oscinids*. A photograph of one of these flies hatched out in this experiment is given in this article (figure 2).



Fig. 2.—*Siphunculina funicola* fly actually hatched from eggs found in bungalow thatch (note well-marked 'humeral cross vein' joining subcostal to costa).

The strong point in the argument against thatch grass being a natural breeding place for the *Siphunculina funicola* flies was the fact that, up to then, so few adults had been bred from eggs or larvæ found in thatch, so that this experiment is important. When one realizes that in a few strands of thatch grass taken from a bungalow roof, no less than twenty flies were bred, it does not take much imagination to think of the number of flies breeding in the thatch of hundreds of tea garden houses. At the same time as the *Siphunculina funicola* flies were bred we hatched out numerous flies from ammoniacal soil of cattle sheds, however, not one of these flies was a *Siphunculina funicola*; they all proved to belong to the *Borboridæ* family. I sent these soil flies to the London School of Hygiene and Tropical Medicine, and they upheld the identification as being *Borboridæ*.

An interesting fact in the breeding habits of these flies in thatch is that, in the majority of

cases, dead flies in disintegrated forms were found together with collections of fly eggs, the whole being laid in a blackish mass entwined in a web. The mass may assume a definite roundish shape, become semi-solid, and eventually act as a 'cocoon mass', harbouring a larva or pupa. The writer has dissected several of these masses and found typical larvæ or pupæ in them; he also dissected out an eye-fly from a pupa found in one of these black masses. This blackish material found on pieces of sun-grass is probably formed from excreta or secreta from the flies themselves. At first it was thought to be due to soot, and the strands of grass covered by this material we called sooty strands. However, its origin from sooty deposits was soon disproved, as pieces of thatch covered with the same blackish substance were found in the eaves of a bungalow in which no fires exist, and therefore there is no soot. Pieces of binding wire found in thatch roofs have been seen to be covered with this black substance, and harbouring a number of live and dead *Siphunculina funicola* flies. On one strand of wire we found a typical hard blackish nodule akin to the nodules described above (figure 3), and on

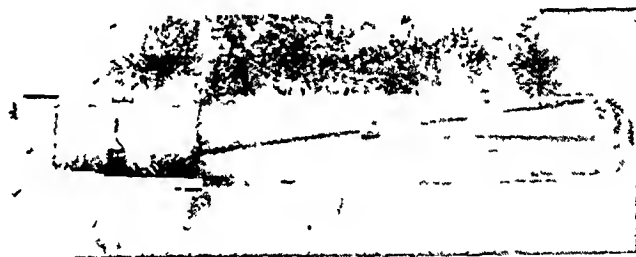


Fig. 3.—Typical 'cocoon type of mass' (black semi-solid) found hanging on a wire outside a bungalow. From many masses, similar to this, *Siphunculina funicola* in young forms have been dissected out. On this actual wire many *Siphunculina funicola* flies were found and the whole wire was covered with a black pultaceous substance.

the same wire, dead and disintegrated *Siphunculina funicola* flies, and many of their eggs were found lying in this blackish substance. One might say the majority of pieces of house thatch examined were covered with this blackish substance, often found to be harbouring the disintegrated forms of the flies, plus their eggs, and in many cases their larvæ. It is certainly not necessary for the larval, and pupal stages, to be encased in this black nodule, as they have more often been found to be lying in the folds of the thatch grass; nevertheless, on many occasions we have found them as described above, namely, encased in these nodular masses (figure 4).

On 30th April, 1938, thatch containing *Siphunculina funicola* eggs was collected (8 pieces of thatch averaging $\frac{3}{8}$ inch \times $2\frac{1}{2}$ inches long); from this three adult *Siphunculina funicola* flies were hatched out on 31st May, two on 11th June, and from that date until 1st November no further flies were hatched out. (I think actually the flies must have hatched out on the night of

31st October, as we examined the tube in the morning of 1st November). This means that fly eggs in thatch are viable for a very long period. In the funnel tube in which we hatched out these flies on 1st November, we also found pieces of pupal skin, dried up and dead *Siphunculina funicola* larvæ, and several eggs, some dried up, but some looked quite healthy.

Description of *Siphunculina funicola* (eye-fly)

The species was originally described by de Meijere.

It is an insect about 1/16th inch in length and is almost black in colour except the wings.

Entomological.—This fly belongs to the *Oscinidæ* family. The male fly is to be distinguished from the female one by the absence of ovipositor.

It possesses head, thorax, two pairs of wings and three pairs of legs. On the head there is a pair of antennæ from the third segment of which arise a pair of very finely feathered aristæ. The proboscis has a stout hook-like process at the tip.

The anterior pair of wings is shining in colour, whereas the posterior pair, the halteres, are not covered with squamas.

The venations of the wings are as follows:

There are four longitudinal veins; the transverse or cross vein, connecting the costa with sub-costa (humeral cross vein), is very prominent and situated at right angles towards the basal area. The vein joining the second to the third is called sectorial cross vein, and that joining the third to the fourth, the radio-medial cross vein. There are three pairs of legs. In the front pairs the femur is black, the tibia and the tarsi are golden in colour without interruption of any other colour.

In the mid and hind pairs—femurs and tibiæ are black and only the tarsi are golden without interruption of any other colour. The coxa femoral joints are golden in colour in each of the three pairs; but the knee joints are golden in colour in the mid and hind pairs of legs only.

Eggs.—The egg measures about 0.5 mm. in length, is whitish in colour, oval and boat-shaped, one end being bluntly rounded off, and the other pointed (figure 5). One side is slightly concave and the other convex.

The surface of the egg is marked by a number of longitudinal striations.

Larvæ.—A mature larva is about $\frac{1}{8}$ inch in length, yellowish white or creamy white in colour, and consists of 13 segments. The head end is

tapering while the posterior end is gradually enlarging and is truncated. The antennæ consist of very small blunt hairy projections only. The anterior spiracles project from the sides of the thorax some distance behind the thorax and each consists of a stalk with five finger-like processes. The posterior spiracles project some distance from the dorsal surface of the eighth abdominal segment.

Pupæ.—The pupa (figure 6) has 10 segments and is slightly shorter in length, but is bigger in size than the larva. It is amber in colour. One surface is comparatively more convex than the other. The anterior end is narrower than the

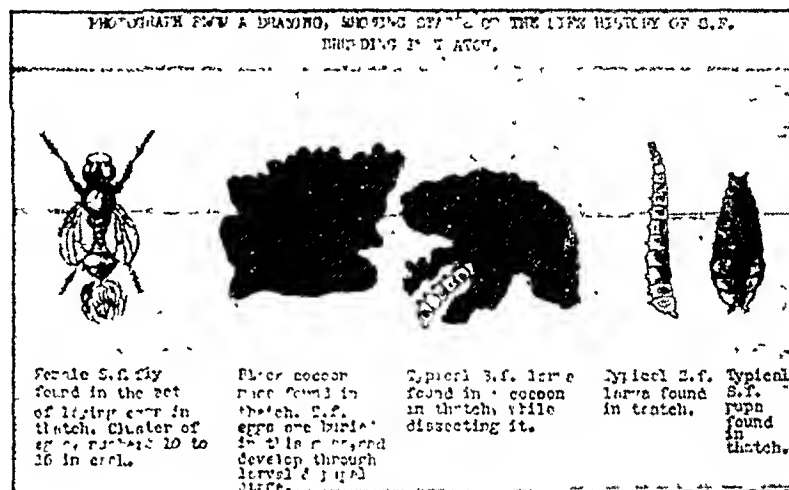


Fig. 4.

posterior, and the spiracles project from the posterior end.

Patton says that one fly can lay as many as 60 eggs; up to now we have only been able to dissect as many as 40 eggs from a single fly.



Fig. 5—Eggs of *Siphunculina funicola* lying in situ on thatch grass.

The fact that the females lay eggs in batches of 5 to 10 is obvious. We have a few flies mounted actually in the position of laying their eggs in

thatch grass and in one of them we found 10 eggs laid in one batch (figure 7).



Fig. 6.—Typical *Siphunculina funicola* pupa in thatch from which a fly had just hatched out.

Duration of phases in life cycle.—In favourable weather conditions the whole life cycle takes about three weeks to complete, but it varies greatly with the variation of the climate.

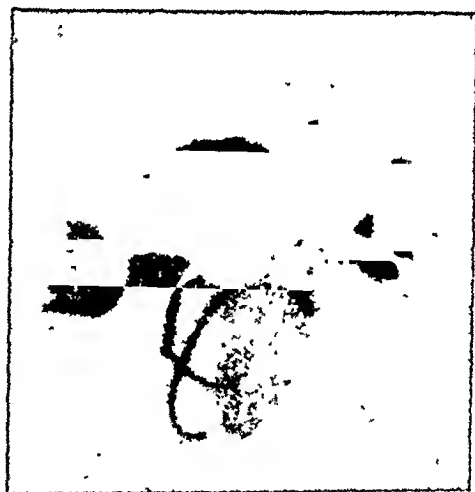


Fig. 7.—Showing batch of 10 eggs laid by the fly.

From larva to adult fly average 7 to 8 days. Actual hatching dates in different experiments were as follows:—

- | | |
|--|-------------------|
| (a) From egg to fly | .. 24 to 25 days. |
| (b) From larva to fly | .. 9 days. |
| (c) From larva to fly | .. 7 days. |
| (d) From larva to fly | .. 8 days. |
| (e) (Media used here was boiled cow-dung on which were placed eggs hatched in thatch). | |
| (i) From egg to larva | .. 10 days. |
| (ii) From larva to pupa | .. 14 days. |
| (iii) From pupa to fly | .. 12 days. |

It must be remembered that these hatching experiments—*a, b, c, d, and e*—were from eggs found in thatch, and not from eggs laid by

'EYE-FLY HOUSE'.



Fig. 8.—The special house erected beside the Juri Valley Medical Association Laboratory, in which some of the experiments were carried out.

flies in captivity. The age of the eggs was unknown, therefore the length of time from the egg to the larva is not given, as it could not be accurately estimated.

Summary

An investigation was carried out into the breeding habits of the *Siphunculina funicola* fly. It was found that in the Juri Valley areas, South Sylhet, this fly breeds in thatch of houses, especially in the thatch of the eaves of these houses. The whole cycle from the egg to the adult fly takes place in the thatch grass. The flies hatched in thatch from eggs after a period of six months.

In ammoniacal soil and decomposed vegetation, it was proved that *Borboridæ* breed in numbers, but no evidence was found of the *Siphunculina funicola* breeding in this type of soil or in decomposed material.

Conclusion

That in the Juri Valley area of Assam, the only place the *Siphunculina funicola* breeds is in thatch of houses. Ammoniacal soil is therefore not a dangerous medium, as far as this fly is concerned, in the Juri Valley.

This research has been brought to a successful climax for two reasons, firstly, because it was a daily investigation and prolonged over a long period; secondly, because it was being conducted on the spot and specimens were therefore available in a fresh condition.

Acknowledgments.—The writer wishes to acknowledge his debt of gratitude to the following:—Professor P. A. Buxton, of the London School of Hygiene and Tropical Medicine, whose collaboration was of the utmost value, Drs. H. N. Chowdhury, L.M.P., K. N. Das, L.M.P., N. C. Deb, L.M.P., for their untiring work throughout varying stages of the investigation. To Dr. S. K. Dutta, L.M.F., L.T.M., Malarialogist, Central Laboratory, Juri Valley Medical Association, for his help in examination of the entomological specimens. Last but not least the whole staff of the Central Hospital, Juri Valley Medical Association, and especially the chief laboratory assistant Sreejut Abinash Chakravarty, who was in charge of the preparation of the microscopic specimens.

APPENDIX A

List of total number of specimens examined:—

Material	* Number of specimens
Thatch grass	525
Ammoniacal soil	145
Fresh soil	23
Materials other than thatch grass and ammoniacal soil, e.g., decomposing vegetation, leaves, banana tree leaves, etc.	71
TOTAL ..	764

* Bottles or tins of specimens sent for examination—one bottle or tin often contained a great number—50 or even more separate specimens for microscopical examination. In all some thousands of specimens were examined microscopically, as the investigation was continuous and daily carried on throughout the whole period from 24th March, 1937 to 30th November, 1938.

APPENDIX B

List showing number of times eggs, larvæ and pupæ simulating those of the young forms of *Siphunculina funicola* were found in thatch grass

Eggs found	340 times
Larvæ found	49 "
Pupæ and pupal skin found	50 "

In all on 28 occasions adult live *Siphunculina funicola* flies were hatched out from young forms found in thatch, giving a total of 56 adults.

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THE QUALITY OF MEDICINAL COD-LIVER OIL AND ITS PREPARATIONS ON THE INDIAN MARKET

By N. K. IYENGAR, M.Sc. (Bom.)
and

B. MUKERJI, M.B. (Cal.), M.D., D.Sc. (Mich.)
(Biochemical Standardization Laboratory, Government of India. All-India Institute of Hygiene and Public Health, Calcutta)

Introduction

COD-LIVER oil is the fixed oil expressed from the fresh liver of the codfish (*Gadus morrhua*, Linn.) by the application of low pressure steam at a temperature not exceeding 85°C., and freed from solid fat by filtration at about 0°C. It occurs as a pale yellow liquid with a slightly fishy but not rancid odour, and a bland, slightly fishy taste. Amongst fatty oils, cod-liver oil occupies a peculiar position chemically, for it contains, besides the ordinary types of fat, glycerides of very non-saturated fatty acids (largely those of Clupanadonic acid, $C_{22}H_{34}O_2$ and of a highly unsaturated acid containing 18 or 20 carbon atoms), which are not found in other oils. The unsaturated character of the fats is an important factor, as on this depends the comparatively easy assimilation and metabolic oxidation of the oil. The unsaturated fatty acids are therefore considered to be of definite therapeutic value. Apart from these, cod-liver oil contains vitamins A and D and these are supposed to be chiefly responsible for its medicinal importance.

Adulteration of cod-liver oil

The best cod-liver oil is extracted from the fat livers of the sea-cod and other species of cod caught in the early part of the winter when this fish makes its way in from the sea to the west coast of Norway, Greenland and Newfoundland, etc., to spawn upon the banks lying off these coasts. Because of the polar ice cap, the small craft found in the coastal waters of Northern Europe cannot reach the fishing grounds on which the best cod is caught. Special types of trawlers are required for such fishing operations. Many fishing fleets not equipped with such trawlers are therefore forced to carry on operations in areas where, along with the cod caught, large numbers of haddock, ling and other fish are usually present. Under ordinary conditions, all the fish livers are pooled together and boiled for extraction of the oil. If the catch contains a mixture of different types of fish it is naturally difficult, unless special precautions are taken, to ensure the production of a uniform grade of cod-liver oil. Such mixed oil is often offered for sale in bulk by wholesale traders and importers. Commercial brand, 'coast cod oil' for instance, is really a mixed fish-liver oil which may have been obtained from any fish, e.g., cod, shark, dogfish, etc., which the trawlers' nets bring up from the open sea. If such foreign

liver oils are mixed in large proportions, the quality and the medicinal virtues of cod-liver oil will naturally be affected. There is another important factor which can bring about a poor quality of cod-liver oils. If the fresh livers obtained from the cod are not immediately boiled and extracted, or are not properly stored in refrigerated chambers, they are likely to be decomposed before long. If decomposed livers are used in the preparation of the oil, the resultant product shows a rich content of free fatty acids, and is likely to lose much of its medicinal efficiency. Apart from these difficulties inherent in the cod fishing industry, there are a number of other ways by which cod-liver oil of commerce may be adulterated. The mixture with cheap and bulky oils derived from 'menhaden', 'seal', 'porpoise', etc., are reported to be not an uncommon occurrence. Rosin oil and cheap-grade mineral oils are also known to be sometimes mixed with cod-liver oil.

All cod-liver oil and its preparations found in India are imported from foreign countries. Because of the widespread prevalence of deficiency diseases in India, cod-liver oil and its preparations are in great demand. According to the figures given in the sea-borne trade statistics of British India, nearly 100,000 pounds of cod-liver oil are annually imported into India at a cost of approximately Rs. 1,50,000. It is either imported in bulk from outside, bottled by local manufacturers and marketed under their own labels and trade marks, or finished preparations of foreign pharmaceutical manufacturers are directly imported.

TESTS FOR PURITY OF COD-LIVER OIL

To prevent the medicinal use of adulterated and low-grade cod-liver oils, the *British Pharmacopæia* 1932 has adopted the following standards for pure cod-liver oil :—

Sp. gravity (15.5/15.5)—0.922 to 0.929.

Refractive index at 40°—1.4705.

Acid value not greater than 1.2.

Saponification value—180 to 190.

Unsaponifiable matter—not more than 1.5 per cent.

Iodine value—155 to 173.

The oil should remain bright when cooled to zero and kept at that temperature for three hours. It should contain in 1 gm. not less than 600 units of vitamin-A activity and not less than 85 units of antirachitic activity (vitamin D). The *B. P.* 1932 states that it should comply with the antimony trichloride test for the presence of vitamin A. This test prescribes a lower limit of 6 Lovibond Blue Units.

The tests for purity and the new official standards for vitamin values in the *British Pharmacopæia Addendum* 1936 ensure an excellent quality of cod-liver oil. Any departure from the limit would indicate either a deterioration of the quality of the oil, or an adulteration with foreign oil of animal or mineral origin. It must be remembered, however, that

no opinion as to the genuineness of a sample of cod-liver oil can be expressed unless it is subjected to all the standard tests prescribed. Conclusions as to the purity or otherwise of a sample drawn from individual determinations of specific gravity, saponification value, iodine value, etc., are open to serious criticism. Thus, the specific gravity determination alone affords no reliable indication of the presence of other fish oils in cod-liver oil samples. The refractometer, again, is of limited use except as a rapid sorting test. A low saponification value of an unknown sample affords an indication that there may be some adulterant in the form of shark-liver oil or dogfish-liver oil. If this low saponification value is associated with a high content of unsaponifiable matter, the presumption of such adulteration becomes very strong. However, the allowable ranges given in the *British Pharmacopæia* 1932 for saponification values are fairly wide (180 to 190) and it is not unlikely that even moderately adulterated samples may conform to the standards in this respect. The same remark applies to the iodine value determinations. The oils from decomposed livers usually show lower iodine values but the *Pharmacopæia* range for iodine values is again fairly wide (155 to 173) and moderately adulterated samples may not be detected if an opinion is offered on this determination alone. The free fatty acid in fresh cod-liver oil should be very trifling in amount. In inferior, old and partially decomposed specimens, the fatty acid value may go higher. The unsaponifiable matter in genuine cod-liver oil contains cholesterol and usually does not exceed 1.5 per cent, as specified in the *British Pharmacopæia* 1932. A higher percentage may indicate the presence of any foreign fish oil, e.g., oil from shark, dogfish, sunfish, etc., mineral oil or rosin oil. An abnormally high value has been ascribed to the presence of porpoise oil. It is impossible therefore to detect definite adulteration or the nature of the adulterant by individual tests. In the survey that has been carried out in this laboratory, the oils have been examined for all their properties strictly according to the methods laid down in the *Pharmacopæia*. A few additional tests mentioned in recent literature were also employed to detect, if possible, the nature of the adulterant. The conclusions drawn are based on the interpretation of all the findings collectively.

PROCEDURE

(a) *Collection of samples.*—In order to obtain a representative picture of the quality of cod-liver oil and its preparations available in the Indian market, samples were obtained from practically all the provinces of British India. In this difficult work, the heads of the medical and public health departments of the provinces co-operated at the request of the Central Government. The samples were received either in sealed original containers or in sample phials containing about 2 oz. each, which were filled in

the presence of a medical officer and sealed properly before mailing. Through the courtesy of the Collector of Customs, Calcutta, samples were also obtained from the customs storehouse within a few days of their importation into the Calcutta port. A few samples were also purchased at random from the open market by the officers of the laboratory. The samples on which the following report is based took nearly two years to collect. The names of the manufacturers were obtained in most cases through the courtesy of the senders but information regarding the dates of purchase and the conditions of storage of the samples were not available in all cases.

(b) *Methods of analysis.*—The analytical methods employed are essentially those described in the *British Pharmacopœia* 1932. Slight modifications were made in favour of more improved methods. In the iodine value determinations, the pyridine-dibromide technique of Rosenmund and Kulmhenn (1923) was employed. This method is generally considered to yield more accurate figures than those obtained by the Wij's method. The method used for preparing, extracting and testing the unsaponifiable fraction of each oil was that described by Smith and Hazley (1930). For the estimation of the vitamin-A content, the direct blue value of the oil was determined by the *B. P.* method (1932), a Lovibond tintometer with artificial light attachment being used. Though the *B. P. Addendum* 1936 recommends either the biological or the spectrographic determination of the vitamin-A content of cod-liver oils, the direct blue value determination is still considered useful for comparative work in sorting oils as good, bad, and indifferent (Coward, 1935). Suitable dilutions were made so that the blue colour produced after the addition of the antimony trichloride reagent could be satisfactorily matched by Lovibond blue between 4 and 6. The values thus obtained for each oil were then converted into the customary Carr-Price value, i.e., the blue value of 0.04 gm. of oil. As vitamin A is now known to be present in the unsaponifiable fraction of the oil, the blue value of this fraction was also determined simultaneously in some cases in order to find out the ratio between the blue value of the unsaponifiable matter and the blue value of the original oil. About 15 samples were subjected to this test and the ratio in all the cases was round about 1.6, agreeing closely with the values reported by Evers (1934). Through the courtesy of the biochemistry department of the All-India Institute of Hygiene, the vitamin-A potency was also estimated in a few specimens by studying the absorption band of the oil in the ultra-violet region at a wave length of 328μ using an ultra-violet spectrograph. The biological estimation of vitamins A and D was not attempted for want of a suitable rat colony.

The 'chill test' was performed by keeping the oils in a clean dry test tube and maintaining it at 0°C ., in the 'biological chamber' of the

refrigerator for three hours, at the end of which period the turbidity, if any, was observed. Common (1937) has reported that the presence of mineral oil as an adulterant in cod-liver oil can be readily detected by exposure of the sample to be tested to the ultra-violet light under the quartz mercury-vapour lamp. The appearance of a bright blue fluorescence, instead of a bright grass-green fluorescence which is characteristic of pure cod-liver oil, indicates the presence of mineral oil. The presence of sperm oil, if in considerable quantities, can also be detected by the appearance of a greenish-blue fluorescence. The samples were submitted to this test also. In none of the samples, however, could the presence of either mineral oil or sperm oil be detected.

Results

The results are represented in table I. Altogether 100 samples were analysed of which two were vitamin-A concentrates, one an emulsion of cod-liver oil and another an extract of malt with cod-liver oil. In table II, an abstract of some of the findings is presented. It will be seen that 64 samples or 64 per cent of the lot were found not to conform to the *B. P.* standards. In almost all these suspicious samples, the values were always in excess of the maximum prescribed by the *B. P.*, indicating that the samples were either old, inferior, or prepared from partially decomposed livers. A few samples failed in all the tests indicating definite adulteration with other fish oils of very inferior grade. The high unsaponifiable matter in some of these lends further support to this conclusion. As many as 25 samples were deficient in vitamin-A content and 4 samples of this group showed absolutely no vitamin A at all. It was observed that although some of them conformed to most of the chemical tests, yet they were deficient in vitamin A, indicating that they were genuine cod-liver oils but of low vitamin-A potency. Most of these were further found to be different in physical appearance and were either of a different colour to a brand of pure oil, or distinctly rancid. A classification of the samples analysed according to their sources of origin (from the labels on the containers) has been presented in table III. Thirty-one samples were obtained directly from countries outside India and of these 16 (51.6 per cent) samples failed to conform to the *B. P.* standards and four specimens were deficient in vitamin-A potency. Out of 65 preparations of local origin, presumably bottled from cod-liver oil imported in bulk, 42 samples failed to satisfy the *B. P.* requirements and 19 showed a poor vitamin-A content. The high percentage of oils with low vitamin-A potency among the specimens marketed by manufacturers in India raises the interesting question that the conditions of storage in the tropical climate may play an important part in the maintenance of the quality of cod-liver oils. Vitamin A is apparently much less stable under

TABLE I

Serial number	Source	Province	Acid value	Blue value on original oil	Blue value on unsaponified matter	Chill test	Exposed to ultra-violet light
1	Indian	Bengal	1.15	6.2	10.2	Clear	Grass-green fluorescence.
2	Foreign	"	1.05	8.5	12.8	"	"
3	"	"	0.78	7.0	11.9	Clear	"
4	Indian	"	4.9	4.2	6.3	Solid fat separates out.	"
5	Foreign	"	0.97	5.5	8.8	Clear	"
6	Indian	"	1.03	5.3	9.5	"	"
7	Foreign	"	0.37	6.9	10.4	"	"
8	Indian	"	"	19.6	29.6	"	"
9	Foreign	"	1.24	7.7	10.8	Clear	Green fluorescence.
10	"	"	4.1	6.8	9.5	"	"
11	"	"	18.5	8.5	11.1	"	"
12	"	Lahore	0.35	5.0	8.5	"	Grass-green fluorescence.
13	Indian	"	0.91	5.5	7.7	Turbid	"
14	"	"	0.42	6.0	8.4	Clear	"
15	Foreign	"	0.40	7.0	9.5	"	"
16	"	"	2.57	5.8	7.5	"	"
17	"	"	0.71	8.0	12.2	"	"
18	"	C. P.	0.49	6.0	"	"	"
19	"	Punjab	1.75	3.6	"	"	"
20	Indian	Bengal	0.91	6.0	"	"	Green fluorescence.
21	"	Punjab	4.89	5.5	"	Turbid	"
22	"	"	1.83	4.4	"	"	"
23	Foreign	Bengal	0.55	13.6	"	Clear	"
24	Indian	Punjab	"	4.6	"	"	"
25	"	"	1.07	7.2	"	"	"
26	"	"	1.66	7.4	"	Turbid	"
27	Foreign	"	0.77	17.8	"	"	Grass-green fluorescence.
28	"	"	"	14.6	"	"	"
29	Indian	"	1.67	6.0	"	Turbid	"
30	"	"	3.04	4.9	"	"	"
31	"	"	3.06	2.0	"	Solid fat separates out.	"
32	Foreign	"	5.6	7.1	"	Clear	"
33	Indian	"	1.4	5.3	"	"	"
34	"	Orissa	0.42	14.7	"	Faintly turbid.	"
35	"	N.-W. F. P.	5.74	9.4	"	Turbid	"
36	"	Punjab	5.5	5.9	"	Clear	"
37	Foreign	"	1.07	15.6	"	Turbid	"
38	Indian	"	0.84	5.3	"	Clear	Green fluorescence.
39	"	"	2.8	7.4	"	"	"
40	Foreign	"	1.61	7.09	"	Turbid	"
41	Indian	U. P.	0.93	9.2	"	"	"
42	"	Orissa	1.27	6.7	"	Clear	"
43	"	Bengal	0.52	7.4	"	"	"
44	Indian	"	0.88	15.1	"	"	Grass-green fluorescence.
45	Not known	Orissa	9.2	4.5	"	"	"
46	Indian	Punjab	2.3	6.9	"	"	"
47	"	U. P.	2.28	5.6	"	"	"
48	"	N.-W. F. P.	1.6	16.6	"	Turbid	"
49	"	Assam	5.7	0.0	"	Clear	"
50	"	N.-W. F. P.	1.5	17.8	"	Turbid	"
51	"	Assam	2.29	7.3	"	Clear	Green fluorescence.
52	"	"	0.41	5.4	"	"	"
53	"	Bombay	0.51	5.9	"	Turbid	"
54	"	Assam	2.01	7.1	"	"	"
55	"	"	0.99	7.1	"	"	"
56	Foreign	Punjab	5.9	6.4	"	Clear	"
57	"	"	0.44	13.6	"	"	"
58	Indian	U. P.	0.50	6.8	"	"	"
59	"	"	1.23	6.5	"	Turbid	"
60	"	"	1.09	8.0	"	Clear	"
61	"	"	1.569	7.1	"	"	Grass-green fluorescence.
62	"	"	1.03	6.2	"	"	"
63	Foreign	Punjab	1.3	7.6	"	Turbid	"
64	Indian	Assam	2.7	6.0	"	Clear	"
65	"	Bihar	1.2	5.2	"	Faintly turbid.	"
66	"	Punjab	2.6	6.0	"	Clear	"
67	Foreign	Orissa	1.85	6.9	"	"	"

TABLE I—concl'd.

Serial number	Source	Province	Acid value	Blue value on original oil	Blue value on unsaponified matter	Chill test	Exposed to ultra-violet light
68	Foreign	Bengal	0.64	7.5	..	Clear	..
69	"	Punjab	3.05	6.3	..	"	..
70	Indian	Bihar	1.1	6.0	..	"	..
71	"	Bengal	0.62	20.3	..	"	Green fluorescence
72	Unknown	Orissa	0.612	6.3	..	Faintly turbid.	..
73	Indian	Bengal	1.19	7.4	..	"	..
74	"	Bihar	1.41	12.9	..	"	..
75	"	Punjab	1.51	6.3	..	"	..
76	Foreign	"	1.27	6.1	..	"	..
77	Unknown	U. P.	2.3	6.0	..	Clear	..
78	Indian	"	1.73	6.9	..	"	Grass-green fluorescence.
79	"	Bihar	1.15	6.5	..	"	..
80	"	Assam	0.98	6.8	..	"	..
81	"	"	2.1	0.0	..	"	..
82	"	"	6.09	0.0	..	"	..
83	"	U. P.	2.8	6.37	..	"	..
84	"	Bengal	5.6	9.6	..	"	..
85	"	"	0.53	12.6	..	"	..
86	"	"	2.1	12.1	..	"	..
87	"	"	5.9	13.7	..	"	..
88	"	"	2.1	12.4	..	"	..
89	Foreign	U. P.	4.04	4.0	..	Faintly turbid.	..
90	"	Punjab	0.73	8.4	..	Clear	..
91	Indian	Bombay	0.88	84.0	..	"	..
92	"	C. P.	2.8	4.7	..	Clear	Characteristic green fluorescence.
93	Not known	"	1.5	13.5	..	"	..
94	Indian	Bombay	..	615.0	..	"	..
95	"	Bengal	2.07	6.3	..	"	Characteristic green fluorescence.
96	"	..	..	12.0	..	..	..
97	"	..	31.8	..	3.2	..	..
98	Foreign	Bengal	0.33	12.2	20.0	Clear	..
99	"	"	4.9	5.0	..	..	..
100	"	"	5.4	6.5	..	..	..

N.B.—The saponification values and the iodine values of the oils are not included in the table, as in most cases these are found to be within the limits prescribed in the B. P. 1932.

TABLE II

Quality of cod-liver oil in Indian market

1. Total number tested .. 100

Not up to B. P. standard	64 (64 per cent)
Number deficient in vitamin A	25 (25 per cent)
No vitamin A ..	4 (4 per cent)

TABLE III

Cod-liver oil, sources of origin

	WITH FOREIGN LABEL		WITH INDIAN LABEL	
	Number	Per cent	Number	Per cent
Not conforming to B. P. standards.	16	51.6	45	69.2
Deficient in vitamin A	5	16.1	19	29.2

Four samples were of unknown origin, of which three were below standard.

the conditions of storage and distribution existing in India. However, as the data regarding the dates of manufacture and conditions of storage and distribution of these oils were not available, no definite pronouncement could be made on the subject. Attempts are being made to work out this aspect of the problem.

Discussion

The importance of cod-liver oil and its preparations in medical practice is too well known to need special mention. As has been already stated, cod-liver oil is not only a rich source of vitamins A and D, but contains in addition a large proportion of unsaturated fatty acids, all of which are of definite therapeutic value. Vitamin A is known to-day to be essential to growth, vision, and the maintenance in normal condition of certain specialized tissues of the body. Its deficiency produces morbid changes in the cornea (keratomalacia) which may, in extreme cases, lead to loss of vision. In addition, vitamin A is also essential for the normal behaviour of the retinal organs and for the formation of rhodopsin (visual purple). Vitamin

D has also undoubted antirachitic properties. Cod-liver oil is one of the few medicines universally used in diseases where a deficiency of vitamins A and D is suspected. It is also used for its food value in wasting diseases and in increasing the general resistance of the body against infective conditions.

In view of such important and vital properties of the oil, it is of great importance to ensure an excellent quality of cod-liver oil for the consumer. The survey that has been carried out in this laboratory reveals a very unsatisfactory state of affairs from the point of view of public health. While it is probable that many samples may have lost their vitamin-A potency due to bad storage and exposure to the hot and humid climates of India, it is not improbable that wilful adulteration is also going on in the drug market. It may be pointed out in this connection that similar surveys have been carried out in Great Britain by Dyer (1933) and by Evers (1934) and in the United States by Nelson and Walker (1932). Both Dyer and Evers found that the cod-liver oils offered for sale in Great Britain were generally of a good quality and most of the samples tested showed a 'blue value' ranging between 6 and 50. Nelson and Walker's findings also revealed a fairly satisfactory situation in the United States. The reason for this difference in the quality of medicinal cod-liver oils is probably due to the fact that in both these countries the regular testing of oils at the port of entry tends to eliminate low-grade oils from the open market.

It is desirable that the medical practitioners should be aware of the poor quality of cod-liver oil and its preparations on the Indian market. The consumers in general are ignorant of the quality of the preparations at the time of buying. The public can only be protected by the enactment of some legislation insisting on a regular and thorough testing of all brands of medicinal cod-liver oil imported, stored and distributed in India.

Summary

One hundred samples of medicinal cod-liver oil and its preparations, with both foreign and indigenous labels, obtained from the civil hospitals, customs department and the open market in different provinces of India were subjected to analyses for their purity and vitamin-A content, according to the methods and standards laid down in the *British Pharmacopæia* 1932 and in other standard books of reference.

Sixty-four samples (64.0 per cent) out of the total failed to satisfy the B. P. requirements. Twenty-five samples were found to be deficient in vitamin A and four samples out of this group were completely devoid of vitamin A.

This survey, the first of its kind in this country, reveals a very unsatisfactory state of affairs in the drug market in India. The public

(Continued at foot of next column)

OBSERVATIONS ON SOME IMMUNOLOGICAL ASPECTS OF LEPTOSPIRAL INFECTIONS

(Part I)

By B. M. DAS GUPTA

(From the Department of Protozoology, School of Tropical Medicine, Calcutta)

Durability of passive immunity induced in the guinea-pig following the infection of anti-leptospira serum

In leptospiral infections in man and animals, about a fortnight after the attack, a substance appears in the blood, which is capable of protecting susceptible animals against infection with this organism. An anti-serum of high potency can also be prepared artificially by immunizing horses, rabbits, etc., with cultures of leptospira. With a view to ascertaining the extent of the period of immunity acquired by the injection of anti-sera obtained from different sources, the following experiments were performed:—

Materials and methods

The serum, obtained from a severe human case of leptospiral jaundice 96 days after an attack, was used for the first series of experiments. The agglutination titre of this serum against the homologous strain was 1:10,000.

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is unaware of the poor quality of such medicines and the doctors prescribing the drug has no means of knowing what is inside the bottle. Only governmental control, as it exists in the progressive western countries, can protect the interests of the consumer and the medical practitioner prescribing cod-liver oil and its preparations to their patients.

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For the second series, anti-serum was prepared by immunizing an adult male rabbit weighing 2,800 grammes by intravenous injections of rich living cultures of the organism recovered from the above case at intervals of five days, in doses from 2 c.cm. to 8 c.cm. The total number of injections was six. The test bleeding was made

seven days after the last injection. The serum reacted with the homologous strain to a titre of 1:100,000. Two days later, the animal was bled to death and about 11 c.cm. of serum were obtained. For the third series of experiments, 'Wellcome' brand anti-leptospira serum, prepared at the Wellcome Physiological Research

TABLE I
Experiments with anti-serum of human origin

Serial number of guinea-pigs	Weight in grammes	Date of inoculation of anti-serum	Date of infective inoculation	Results
1	218	24-1-38	25-1-38	Remained alive and well for 15 days.* Do. Do. Do. Do. Do. Do. Do. Do.† Do.†
2	210	25-1-38	27-1-38	
3	248	25-1-38	30-1-38	
4	213	25-1-38	3-2-38	
5	211	25-1-38	6-2-38	
6	212	25-1-38	9-2-38	
7	242	25-1-38	12-2-38	
8	219	25-1-38	15-2-38	
9	243	25-1-38	18-2-38	
10	242	25-1-38	21-2-38	
11	213	25-1-38	24-2-38	Died of leptospiral infection on 28-2-38.
12	198	25-1-38	26-2-38	Marked jaundice and hæmorrhages from nostrils and anus on 28-2-38 and died next morning. Blood positive for leptospira on 29-2-38 and the animal died two days later.

* Animals that remained alive and well for 15 days were considered sufficiently protected against the infection.

† As a suitable culture was not available at the time, the animal was inoculated with 2 c.cm. of infected guinea-pig's liver emulsion. The control animal also received similar inoculation.

TABLE II
Experiments with immunized-rabbit serum

Serial number of guinea-pigs	Weight in grammes	Date of injection of anti-serum	Date of infective inoculation	Results
1	210	2-4-38	12-4-38	Remained alive and well far beyond the usual fatal period. Do. Do. Do. Do.
2	199	2-4-38	22-4-38	
3	216	2-4-38	2-5-38	
4	215	2-4-38	12-5-38	
5	211	2-4-38	24-5-38	
6	248	2-4-38	29-5-38	Died of leptospiral jaundice on 29-5-38. Developed leptospiral infection.*

* On the fifth day of inoculation the animal showed marked jaundice and leptospiræ were present in the peritoneal fluid. It was then killed to provide material for demonstration to the students.

TABLE III
Results of the inoculation of the commercial anti-leptospira serum (B. W. and Co.)

Serial number of guinea-pigs	Weight in grammes	Date of injection of anti-serum	Date of infective inoculation	Results
1	232	4-6-38	9-6-38	Alive and well for 15 days. Do. Died of leptospiral infection.* Do. Do. Do.
2	246	4-6-38	14-6-38	
3	218	4-6-38	19-6-38	
4	233	4-6-38	24-6-38	
5	218	4-6-38	4-6-38	
6	247	4-6-38	4-6-38	

* As the animals which received the infective inoculation on 19-6-38 and 24-6-38 died, it was considered unnecessary to inoculate the last two animals of the series.

Laboratories, and recommended for the prevention and cure of leptospiral jaundice in human beings, was used. Young guinea-pigs weighing less than 250 grammes received 0.4 c.cm. each of the anti-sera, obtained from these various sources by intraperitoneal injections. The human and rabbit's sera were without preservatives while the commercial anti-serum was treated with 0.4 per cent tricresol.

Unless otherwise indicated, the infected material consisted of a rich culture of leptospira isolated from the human case referred to above, which had proved extremely virulent to guinea-pigs. The dose amounted to 2 c.cm. in each case. The injections were given into the peritoneum 24 hours after the protective inoculation. An equal number of guinea-pigs of about the same weight, which were treated each with 0.4 c.cm. of normal horse serum before the infective inoculation, served as controls.

All the guinea-pigs serving for control succumbed to leptospiral infection in from four to eight days, the mean being 5.12 days. It will be seen from the foregoing table that the protection conferred on the guinea-pig by the injection of serum of a human case which had recovered from the infection lasted for 25 days, but did not extend beyond 27 days.

From the results of the experiments, as shown in table II, it is evident that the immunity acquired by the injection of immunized rabbit's serum persisted for 41 days but did not continue till the 53rd day.

Inasmuch as the commercial serum was not prepared against the particular strain of leptospira which was employed for testing the potency of the serum, it was expected that the titre of its protective antibodies would be reduced. The infective inoculation was, therefore, given at shorter intervals after the injection of the anti-serum than in the experiments shown in table II. The results in table III show that the immunity acquired by the use of commercial anti-leptospiral serum lasted for 10 days and did not extend beyond 14 days.

Summary and Conclusions

The immunizing value of anti-sera obtained from three different sources was tested. It was found that the immunity acquired by the injection of these sera is a transient condition. As for example, protection conferred on the guinea-pig by the injection of serum of a human case which had suffered from a severe attack of leptospiral jaundice lasted for 25 days but did not extend beyond 27 days, by the immunized-rabbit serum for 41 days but did not continue more than 52 days, and the immunity acquired by the use of 'Wellcome' brand anti-leptospira serum, recommended for the prevention and cure of leptospiral infections in human beings, lasted only 10 days. It thus appears that the administration of anti-serum is not of much practical value as a prophylactic measure, although it can

(Continued at foot of next column)

A METHOD OF FILLING SCREW-CAPPED BOTTLES WITH FLUIDS UNDER STERILE CONDITIONS

By C. L. PASRICHA

MAJOR, I.M.S.

A. J. H. DEMONTE, D.B., I.M.D.

and

S. K. GUPTA, M.B., D.T.M.

(From the Department of Bacteriology and Pathology, School of Tropical Medicine, Calcutta)

DURING the course of a recent experiment in which large quantities of bacteriophage were required, screw-capped bottles were used for its filling and distribution. As these bottles have proved very satisfactory and the method of filling is simple and inexpensive a short description is given below.

Bottles of required size with well-fitting screw caps and of suitable glass are selected. For our purpose we used one-ounce bottles with 'bakelite' screw caps costing Rs. 3-8 a gross. These bottles were available in large quantities in the local market. The cork liner in the screw cap was removed and in its place a rubber washer, cut by means of a hollow punch, was inserted. Washers made from the sheet rubber of a motor cycle inner tube, as described by McCartney (1931) for his blood culture bottles, were found to be satisfactory. Bottles with well-pressed cork-washers of good quality or with liners of thick oil paper can be used.

The bottles with their screw caps loosened a quarter of a turn are arranged mouth downwards in a metal container. This consists of a flat-bottomed metal drum with a flange on which rests a cover on a suitable washer to render the seal air tight. The whole structure resembles a small-sized autoclave, but without the hinged screw and winged nuts. Two removable clamps placed at opposite poles serve to maintain the lid in position and, once the cover has been subjected to atmospheric pressure by the creation of partial vacuum inside the drum, the seal between the filler and the cover remains air tight. In the cover are two openings to which are fitted stop-cocks arranged upright and protected from injury by a removable metal cover. The inside of the filler is heavily tinned or can be nickel or silver plated if desired. It is economical to have the containers of different depths to hold bottles of different sizes, but of

(Continued from previous column)

be usefully employed in inducing resistance to the infection for a short period.

The sera obtained from the first two sources (human and immunized rabbit) were tested against homologous strains. It is therefore expected that the titre of protective antibodies of these sera should be higher than that of the commercial serum, which was apparently prepared against leptospiræ obtained from different sources.

the same circumference, so that one lid can be used for different sized containers. It is convenient to have two removable metal partitions to fit the inside of the container and arranged so that they can be placed at right angles inside the container. This allows the bottles to be arranged more easily and prevents the bottles from falling during their removal.

The container is filled with bottles, the lid placed carefully on the top and is secured in position by the two clamps. The cover is placed on the stop-cocks and the whole apparatus is wrapped in paper and sterilized in an autoclave at 10 lb. pressure for 15 minutes.

For use one of the taps is connected with a vacuum pump through a vacuum reservoir and the other tap is connected with a sterile rubber tubing to a candle for filtration of the fluid. Vacuum is first created in the filler to ensure a perfect seal between the cover and the bottle container and then the stop-cock on the tube connected with the candle is opened and filtration of the required amount of fluid is allowed to take place under a moderate degree of vacuum. When the necessary amount of fluid has passed into the filler, the stop-cock on the inlet connected with the candle is closed and further vacuum is created to exhaust the air in the bottles (usually a vacuum of 30 inches maintained for 5 minutes is sufficient). The connection to the pump is now closed and air, filtered through a cotton-wool filter or through a candle, is slowly admitted into the filler. The bottles are filled and the lid of the filler is removed. The bottles are removed and the screw caps tightened by hand or by that ingenious device of a bored-out rubber bung used by Mackie and McCartney (1934) for opening screw-capped bottles.

The advantages of the use of screw-capped bottles for the filling of fluids under vacuum are

numerous. Where quantities of more than 10 c.cm. are required it is definitely more economical both in actual cost and time to use screw-capped bottles instead of ampoules or rubber-corked bottles as described by Asheshov (1931). Although they have been found particularly useful for filling, storage and distribution of bacteriophage, the screw-capped bottles filled under vacuum can be of great use in the distribution of therapeutic sera such as anti-plague, anti-dysentery, anti-meningococcal and anti-venine sera and of various types of prophylactic vaccines. One of the outstanding advantages of screw-capped bottles is that the screw cap can be removed and part of the contents poured out without any great risk of contamination of the rest of the fluid in the bottle. It has been proved that a bottle containing bacteriophage can be opened to pour out individual dose and closed again without the rest of the contents becoming contaminated. This is due to the fact that the mouth and upper part of the neck of the bottle is covered by the screw cap and remains sterile, whereas in an ordinary corked bottle the mouth is grossly contaminated and the contents soon become spoilt.

Summary

The use of screw-capped bottles for filling and distribution of bacteriophage is described. This method has also been found to be very satisfactory for filling sera and vaccines.

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A Mirror of Hospital Practice

A CASE OF TYPHUS FEVER

By S. K. SARKAR, M.B.

Assistant Surgeon, B. N. Railway, Titilagarh,
Sambalpur District

I HAVE been employed as a railway doctor in various parts of the section of the line which passes through jungles from Raipur in the C. P. to Vizagapatam in Madras. This case of typhus fever occurred at Nawapara Road, 60 miles south-east of Raipur. It is the only case of typhus fever I have ever seen and my medical officer who saw this case told me that he had seen only four cases during his 25 years' practice. Sir John Megaw who himself got typhus fever after being bitten by a tick in the Kumaon hills in the U. P. and Col. Stott of the Lucknow Medical College have shown that typhus fever

is not rare in the United Provinces. But typhus fever has been very rarely reported from other parts of India*. Because of this rarity, I am reporting this case, the diagnosis of which was arrived at by a process of exclusion and later confirmed by serum reaction.

History of onset and progress of the case.—On 23rd October, P. S., a station master, aged 47, felt unwell

* We cannot allow this statement to pass without comment. This subject was discussed by us in an editorial in April 1936, when reference was made to a paper by Major J. S. K. Boyd, R.A.M.C., in which he had collected details of 110 cases that had occurred in the army, or in persons associated with the army, during one year only. These cases occurred in many parts of India. The disease is therefore probably widespread in India, but we admit that it is probably not recognized as often as it should be. For this reason we welcome this contribution.—EDITOR, *I. M. G.*

in the morning. At night he had a definite rigor and moderately high temperature (102°F.). Next day he had pain all over the body, worse in the back and thighs. He started vomiting bile and temperature was higher. He was seen by the sectional doctor this day who took a blood slide for malaria parasites and gave him an atabrin musonate injection (0.3 gm.) intramuscularly. Next day, i.e., third day of the disease, his pain was worse, headache very severe and vomiting incessant. He was given another atabrin musonate injection (0.3 gm.). There was no impression on the clinical picture. I was called on 28th October. Temperature was high, headache very bad, vomiting incessant, tongue thickly coated and dry, nervous prostration marked.

As the blood result had not yet arrived and clinically it seemed to be a case of malignant tertian malaria which is common in this district, I suggested another atabrin musonate injection and advised removal to the railway hospital of which I am in charge. On 30th October, 1938, i.e., eighth day of illness, he was admitted into the railway hospital.

30th October.—Temperature (103.4 to 103°F.), vomiting troublesome, headache severe, eyes congested and icteric (might be due to atabrin), nervous prostration very marked, tongue very thickly coated and dry, spleen and liver just palpable, bowels constipated. As the blood result which had arrived by then and therapeutic tests were both negative and the clinical picture was one of continuous temperature with fairly severe toxæmia, I thought now that it was a case of enteric fever. On the same day, i.e., eighth day of illness, serum for Widal and blood slides for malaria, and differential count were sent to the railway bacteriological laboratory at Khargpur.

31st October.—Temperature 101.2 to 101.4°F., vomiting less, other conditions same.

1st November.—Temperature 100.4 to 101.6°F., vomiting stopped, headache very severe, tongue dry, exhaustion extreme. Dark red macular rash noticed in the trunk and upper extremities. Regarded as typhoid rash by me.

2nd November.—Temperature 102.4 to 102.6°F., condition same, rash extensive.

3rd November.—Temperature 102.6 to 101°F., dark red macular rash all over the body, bloated appearance, bronchitis appeared, no urine passed, pulse feeble and rapid, condition worse.

4th November.—Temperature 101.6 to 101.2°F., urine passed, other conditions same. Pathologist's report:—

	1/25	1/50	1/83	1/125	1/250
T	..	—	—	—	—
A	..	—	—	—	—
B	..	—	—	—	—
T (O)	..	—

Blood slide.—No malaria parasites found.

Differential count—

Polymorphonuclears	..	..	74 per cent.
Lymphocytes	..	..	22 "
Large mononuclears	..	..	4 "
Eosinophils	..	..	0 "
Abnormal cells	..	..	Nil.

Another sample of serum was now sent for Weil-Felix and Widal (twelfth day of the disease).

5th November.—Temperature 102 to 102.2°F., condition same, rash still present.

6th November.—Temperature 99.6 to 102°F., condition a little better, pulse not so feeble, tongue not so dry, rash present.

7th November.—Temperature 100 to 101.2°F., condition better, rash present.

8th November.—Temperature 99 to 101.4°F., condition improving, pulse stronger, tongue moist, rash present.

9th November.—Temperature 100.4 to 100.4°F., condition better, rash present. Pathologist's report:—

	1/25	1/50	1/83	1/125	1/250
T	..	—	—	—	—
A	..	—	—	—	—
B	..	—	—	—	—
T (O)	..	—
Proteus—					
X2, O	..	+	+	—	—
XK, O	..	+	—	—	—
X19, O	..	—	—	—	—

Pathologist suggested another sample of serum to be sent later on.

10th November.—Temperature 99 to 100.6°F., condition still more improved, tongue moist, eyes less congested, rash still present.

11th November.—Temperature 98.2 to 99.2°F., touched normal for the first time.

12th November.—Temperature 97.6 to 99°F.

13th November.—Temperature normal throughout the day and kept normal since, rash still present, getting fainter, no desquamation was ever noticed.

20th November, i.e., twenty-eighth day from the onset, serum was again sent for Weil-Felix and Widal. Result is as follows:—

	1/25	1/50	1/83	1/125	1/250
T	..	—	—	—	—
A	..	—	—	—	—
B	..	—	—	—	—
T (O)	—	—
Proteus—					
X2, O	+	+	+	+	+
					(end point not determined).
XK, O	—	—	—	—	—
X19, O	—	—	—	—	—

Conclusion.—But for the serum tests (Widal and Weil-Felix), this case would certainly not have been diagnosed by me.

The source of infection could not be ascertained. The patient is emphatic that he was never bitten by a tick, a flea or a mite. There has been no other case of typhus in that house or locality. Under the circumstances I conclude that this was a case of non-epidemic tropical typhus of unknown or uncertain vector (Megaw's classification).

Treatment was symptomatic. Sulphonamide (B. & W. Co.) was tried empirically for four days (6 tabloids a day for first two days and 3 tabloids a day for next two days) with no apparent effect.

Diet was butter-milk and orange juice throughout (two-hourly feeds, alternately).

My thanks are due to my chief, Dr. W. D. Speedy, for permission to publish this case, to my medical officer, Dr. M. N. Sarkar, who saw the case and confirmed my clinical diagnosis, to Dr. Mandal, Malaria Inspector, Ambodala, who examined the blood slide and to Dr. M. Sen-Gupta, Pathologist to the B. N. Railway, who carried out the various tests and thereby confirmed the diagnosis of typhus fever.

Indian Medical Gazette

APRIL

THE ANTI-TUBERCULOSIS MOVEMENT AND SOCIAL SERVICE

THE King-Emperor's Anti-Tuberculosis Fund has been closed; the total of 76 lakhs is a little below the figure that Her Excellency the Marchioness of Linlithgow hoped to raise, but, in times that are far from affluent, it is a very notable achievement to have raised so large a sum. Sufferers from tuberculosis, present and future, and their friends and relatives, will owe an eternal debt of gratitude to Her Excellency for planning so skilfully and carrying through so energetically 'the first successful engagement in a great campaign'. That Her Excellency has had the support of the spokesmen of all castes and creeds, of people of all shades of political opinion, and of the whole press in this vast and heterogeneous country, is greatly to the credit of both the appellant and those to whom she appealed.

The arrangements being made under the aegis of the Fund imply that for the first time in Indian experience special measures for combating tuberculosis in a methodical and expert manner are being taken, and permanent committees are being set up. Preparations are now well advanced for the actual task of relieving the sufferers from this disease and opening the real fight for its eradication', says Her Excellency in her statement on the closing of the Fund.

It will be a great mistake if those interested in this movement imagine that they may now relax their efforts; on the contrary, 'they should again advance and engage the enemy, an enemy far more difficult to subdue than any army of disciplined troops, an enemy which fights by stealth and lurks in every corner of every home. It is only by means of unremitting vigilance that success will finally be achieved, and this enemy of mankind overcome', to quote from the same statement.

When the appeal was launched it was suggested that there would be a central body and provincial—and possibly state—organizations. The central body has now been registered as the Tuberculosis Association of India. Many provincial tuberculosis associations already exist, and other provinces and many of the states have agreed to form their own associations, all of which will in due course be affiliated to the central association.

Elsewhere in this number will be found a statement regarding the policy of the central association. The central association will not control the provincial associations in any way; it will act only in an advisory capacity and as

a co-ordinating agency. It will establish a statistical and information bureau and will standardize methods so that data and results obtained in different provinces will be comparable. Other co-ordinating activities will include promoting conferences, training workers, and possibly publishing an all-India tuberculosis journal. Research, and education of the public by different forms of propaganda, will fall within its scope.

The duties of the provincial organizations will be numerous and varied, and will depend largely on the special local conditions, but with a total of probably two million cases of tuberculosis in India it is obvious that under present economic conditions sanatorium accommodation cannot be provided for even one per cent of sufferers, and that the tuberculosis dispensary will be the mainstay of the campaign against this disease. It has often been suggested that at the tuberculosis dispensary the patient can get little more than the diagnosis of his disease and advice on the form of treatment most suited to his case. This of course is a pessimistic point of view, as it is possible to do much more than this under dispensary conditions, *e.g.*, to mention one point only, the initiation and maintenance of collapse therapy. But, nevertheless, it is true that unaided the tuberculosis dispensary would put up a poor fight against this disease and the success of a dispensary in any district will depend largely on the amount of support it obtains from the social service organizations in the locality.

A statement on the subject of social service and tuberculosis which has recently been issued by the executive of the King George V Anti-Tuberculosis Fund is reproduced elsewhere in this number. This should be read carefully by all interested in the subject, as it presents in a very clear and concise form the scope and opportunities for social service in connection with the tuberculosis problem. The responsibility for the organization of the social service should not rest in any way with the dispensary staff, but the formation of a local 'care committee' should be undertaken by responsible residents in the locality. The work initiated by this committee should of course be on a voluntary basis, but funds will be necessary and and it should be emphasized that these should be entirely separate from the funds of the dispensary. There will be ample opportunities for those who cannot afford to subscribe to the funds, but are prepared to devote some of their time to the work undertaken by this committee.

As the value of the dispensary will depend largely on the amount of local support and co-operation that it obtains, it is obvious that dispensaries should be placed only in such places as are likely to give this support, and, as the executive of provincial tuberculosis associations will be largely influenced in this matter by the state of the existing social services in any locality,

Special Articles

A STUDY OF THE DIET OF THE BENGALI HINDUS AND THEIR NUTRITION

By DURGA DAS MITRA, M.B., D.P.H., M.Sc.
(From the Department of Biochemistry and Nutrition, All-India Institute of Hygiene and Public Health, Calcutta)

THIS study comprised the following numbers of families at the stated places :—

Place	Number of families	Number of persons	Number of consumption units
Dinajpore ..	40	204	168.2
Barasat ..	10	79	58.8
Calcutta ..	5	48	38.5

The Calcutta families were of the better type middle-class, including officers and professional people, earning about Rs. 200 to Rs. 500 a month.

Dinajpore and Barasat families belonged to the agricultural class. They worked on the land themselves and often employed additional labour as well. Practically all of them were dependent to a large extent on the land to supply their needs. Existence appeared to be rather hand to mouth, and little money was handled. At Barasat, a certain amount of barter existed, fish, etc., being exchanged for soil products. From the local conditions it appeared that the families under observation at Dinajpore were poorer than those at Barasat, and this supposition was later on verified by the calculated analytical figures of their respective diets. It seemed however that more could have been made of the ground, had they possessed the will and energy to work it, and worked harder.

Diet survey

The survey was carried out by a house-to-house visit and covered a period of three weeks in Dinajpore, and a week each in Barasat and

TABLE I
Average number of persons and consumption units per family at Dinajpore, Barasat and Calcutta and average intake of proximate principles, calories, minerals, and vitamins per consumption unit per day

			STANDARDS						
			Dinajpore	Barasat	Calcutta	Health Bulletin	Stiebling	Sherman (1937)	British Medical Association (1933)
Number of persons ..			5.1	7.9	9.6	..	..	..	..
Number of consumption units ..			4.2	5.9	7.7	..	..	..	..
Protein (g.)	{	Total protein ..	70.6	78.4	94.0	65	68	1 g. per kg. body-weight.	100
		Percentage of animal protein.	5.4	10.8	47.7	20	..	..	50
Fat (g.)	{	Total fat ..	14.0	19.7	86.5	45-60	..	..	100
		Percentage of animal fat.	4.9	14.3	46.9	..	..	..	..
Carbohydrate (grammes) ..			583	562	402	..	..	..	500
Calories	{	Total calories ..	2,742	2,743	2,787	2,600-3,000	2,810	..	3,000 (net)
		Percentage from cereals	91.4	78.0	48.5	..	..	..	..
Mineral matter (grammes)	{	Total mineral ..	7.72	9.71	12.09	..	..	..	..
		Calcium ..	0.22	0.47	0.79	0.68-1.0	0.9	0.68	..
		Phosphorus ..	2.24	2.19	2.02	1.0	1.23	1.32	..
		Ratio Ca : P ..	1 : 10.2	1 : 4.6	1 : 2.6	..	..	..	..
		Iron, mg. ..	24.43	27.0	28.39	20	13-14	12	..
Vitamins (International units, unless otherwise specified)	{	Vitamin A ..	11	63	819	} 3,000	3,800	..	..
		Carotene ..	367	3,581	6,809			..	..
		Vitamin B ₁ ..	770	767	686	300	..	..	..
		Flavin, mg. ..	1.336	1.422	1.277	..	..	..	..
		Vitamin B ₆ (rat units). ..	439	263	326	..	..	..	..
		Vitamin C, mg. ..	45	86	133	30-50	95	..	..

Calcutta. The analysis of the diets covers the following; total protein, animal protein, total fat, animal fat, carbohydrate, total calories, per cent calories from cereals, total minerals, calcium, phosphorus, Ca:P ratio, iron, vitamin A, carotene, vitamin B₁, flavin, vitamin B₆ (antidermatitis), and vitamin C.

The food values were taken largely from the *Health Bulletin No. 23* (Aykroyd, 1937) and from figures obtained from the laboratory.

Discussion of diets

The family coefficients, as given in the *Health Bulletin*, have been employed for working out the consumption units (henceforth c.u.).

The following are the calorie consumptions per c.u. per day :—

Groups	Calories
Dinajpore ..	2,742
Barasat ..	2,743
Calcutta ..	2,787

The League of Nations (1936) puts forward a figure of 2,400 calories net *plus* 75 for each hour of moderate work; assuming that they do an eight-hour day, this would mean a total requirement of 3,000 calories net. The British Medical Association (1933) comments that 3,400 calories, in the food as purchased, is a safe figure for the daily requirement; this should assure 3,000 available calories, allowing for wastage in preparation and digestion. The *Health Bulletin* suggests a total daily intake for the average Indian of 2,600 calories.

The similarity between the Dinajpore and Barasat figures is striking, and their difference from the Calcutta figure is not marked. But the calorie needs of the agricultural manual labourers are much more than the Calcutta well-to-do people, and it may be assumed that they actually consume less than they should.

Protein

The consumption of protein ranges from 70.6 g. (Dinajpore), 78.4 g. (Barasat) to 94.0 g. (Calcutta) per c.u. The percentage derived from animal sources likewise shows a similar trend, *viz.* 5.4 per cent (Dinajpore), 10.8 per cent (Barasat), and 47.7 per cent (Calcutta). The well-to-do in Calcutta obviously by choice have a protein consumption which is about quantitatively and qualitatively on a par with European standards, while the agriculturists are at a definitely low level in both those respects.

Fat

The consumption of fat ranges from 14.0 g. (Dinajpore), 19.7 g. (Barasat) to 86.5 g. (Calcutta) per c.u. The percentage derived from animal sources likewise shows a similar trend, *viz.* 4.9 per cent (Dinajpore), 14.3 per cent (Barasat) and 46.9 per cent (Calcutta). It is interesting to note that these percentages run more or less parallel to those of protein,

though with an improvement in the economic status, the absolute increase in the fat intake is much greater than that in the protein. The Calcutta families consumed six times as much fat but even less than one-and-half times as much protein, as the Dinajpore agriculturists. A similar observation has been made in Europe by Catheart and Murray (1932), where an increase in the food budget was associated with a larger fat consumption, often with little or no change in the protein level. The problem of the fat requirements is as yet an unsolved and somewhat neglected problem, but, from the standard of 45-60 g. given in the *Health Bulletin*, it appears that the agriculturists consume very little indeed !

Carbohydrate

As was to be expected, the agriculturists consume more carbohydrate, chiefly derived from the cheap cereals, than the Calcutta families; in fact, they derive about 80 to 90 per cent of their total calories from cereals, whereas the Calcutta families derive only 48 per cent.

TABLE II

Showing percentage distribution of calories in protein, fat and carbohydrate

Place	Dinajpore	Barasat	Calcutta	British Medical Association recommendation (1933)
First class protein	0.6	1.2	6.5	6
Second class protein	9.8	10.2	7.1	6
Fat ..	4.6	6.5	28.3	27
Carbohydrate ..	85.0	82.0	58.0	61

The table vividly shows the adequate distribution of calories in the proximate principles in the Calcutta group according to the British Medical Association standard, and the inadequate distribution among the other groups.

Minerals

The consumption of total minerals, calcium, and iron gradually increases from the Dinajpore group to the Calcutta group, while the phosphorus figure does not show much variation, with the result that the Ca:P ratio gradually increases, *e.g.*, 1:10.2 (Dinajpore), 1:4.6 (Barasat), and 1:2.6 (Calcutta). Sherman (1937) observes that 'during rapid growth and calcification, it is well that the food as a whole should have a Ca:P ratio somewhere between 1 and 2'. Only the Calcutta diet approaches this standard.

The calcium consumption in Calcutta families satisfies the recognized standard, though the agriculturists fall below it. The phosphorus and iron consumptions are up to the mark in all, the former mainly coming from the cereals and the latter from the green vegetables in the case of the poor villagers.

Vitamins

Carotene in the present analysis is expressed in terms of its corresponding vitamin-A equivalent and it is found from the table that the vitamin A (including carotene), vitamin B₁, and

brought out by calculating the increase in body-weight in relation to the protein consumption. The following table (IV) shows, between the age groups 7 and 12, the average increase in body-weight per annum in kilogrammes, and the

TABLE III

Showing height, weight and dynamometer grip of the Dinajpore, Barasat and Calcutta boys

Age group	HEIGHT			WEIGHT			GRIP		
	Dinajpore	Barasat	Calcutta	Dinajpore	Barasat	Calcutta	Dinajpore	Barasat	Calcutta
7	45.0	45.8	48.1	41.2	40.8	47.7	13.3	14.7	14.0
8	47.6	47.2	48.5	48.1	43.9	50.2	17.8	16.6	19.9
9	49.6	49.8	51.3	51.1	50.9	56.2	19.9	19.9	20.9
10	50.9	51.7	52.4	54.8	54.7	58.3	21.8	22.8	21.6
11	51.4	53.1	53.8	59.5	59.8	63.4	24.8	25.7	24.8
12	54.0	54.7	56.5	64.2	63.1	75.0	25.8	27.3	28.4

vitamin C satisfy the standards in all cases, except a deficiency in vitamin A (including carotene) in the Dinajpore group, where further a dearth of fat in the diet may be responsible for the carotene being not all absorbed. The deficiency in carotene in Dinajpore however can be easily rectified by taking more of the green leafy vegetables, *e.g.*, amaranth leaves. In villages many edible leafy vegetables grow by the sunny wayside, and the villagers have only to pluck them in order to get them, as is done in Barasat.

Growth of the children

Children for proper growth require proportionately more protein (specially animal protein) and more calcium, phosphorus and total calories than adults.

The deficiencies in the important food principles, specially among the agricultural class boys, produce in corresponding age groups, less growth in height, weight and the power of grip as compared with the better-off class boys

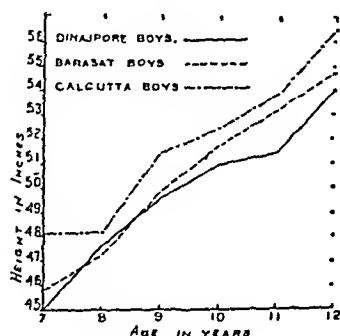
increase in weight per annum per kilogrammes body-weight per gramme of protein consumed per day.

TABLE IV

	Average rate of growth per annum, kg.	Average rate of growth per g. protein consumed per kg. body-weight per day
Dinajpore ..	2.10	1.11
Barasat ..	2.05	0.93
Calcutta ..	2.46	1.07

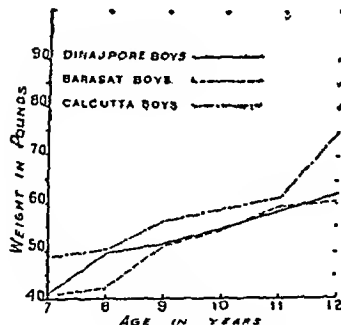
It is to be noted that there is not much difference between the rates of growth per gramme of protein consumed in the three groups, and, if anything at all, a slightly higher rate at Dinajpore would appear to indicate that in this group the assimilation and utilization of protein and/or food is somewhat better than in the other

CHART 1



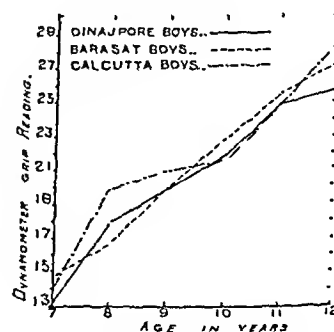
Height—Age.

CHART 2



Weight—Age.

CHART 3



Dynamometer grip—Age.

(table III, Charts 1 to 3). A similar observation was made in a previous survey (Wilson, Ahmad and Mitra, 1937).

A significant feature which probably illustrates physiological economy in nutrition is

groups with a larger food intake, though it seems possible that an insufficiency of building materials has at an earlier age kept back the Dinajpore group to the Calcutta group by a year or two.

Symptoms of deficiency and other diseases

The incidence of caries showed no correlation with diet (21.1 per cent at Dinajpore; 26.1 per cent at Calcutta). The incidence of enlarged tonsils, if anything at all, appeared to show a negative correlation with the poverty of the diet. Among Dinajpore boys it was 11.3 per cent while at Calcutta it was 44.6 per cent. The open, comparatively cleaner air and the sunshine, in which the village boys play and work, may be responsible for the comparatively less incidence of caries and enlarged tonsils

TABLE VI
A C H index figures

Locality	Total number examined	A C H INDEX SELECTION	
		Number	Per cent
Dinajpore ..	318	146	45.9
Barasat ..	198	67	33.8
Calcutta ..	331	54	16.3

TABLE V

Showing incidence of different clinical conditions observed among Dinajpore, Barasat and Calcutta boys. Number of cases and percentage

Locality	Total number examined	Angular stomatitis	Phrynodermia	Xerophthalmia	Bitot's spots	Caries	Mal-occlusion of the teeth	Enlarged tonsils
Dinajpore	539	31 (6.3%)	3 (0.5%)	11 (2.0%)	5 (1.0%)	114 (21.1%)	46 (8.5%)	61 (11.3%)
Barasat ..	294	..	..	..	..	82 (27.9%)	44 (14.9%)	85 (28.9%)
Calcutta ..	298	..	..	..	..	48 out of 184 cases examined for caries (26.1%)	24 (8.0%)	133 (44.6%)

among them. Besides, the higher incidence of caries among the well-to-do may be associated with the consumption of sweetmeats.

The correlation between the incidence of mal-occlusion of teeth and the economic status which was observed in a previous survey (Wilson and Mitra, 1938), and Nicholls (1936) in Ceylon, was not however observed to exist in a great degree in the present case, 8.5 per cent at Dinajpore and 8.0 per cent at Calcutta.

Definite cases of angular stomatitis (6.3 per cent) and phrynodermia (0.5 per cent) were observed amongst Dinajpore boys, while only a few doubtful cases at Barasat or Calcutta. The skin of the Dinajpore children was dry and rough in many cases both in appearance and touch. This dryness of the skin and the incidence of phrynodermia may be associated with their low fat and vitamin-A (including carotene) intake.

Also the incidence of xerophthalmia (2 per cent) and Bitot's spots (1 per cent) among Dinajpore boys is significant as the vitamin-A (including carotene) consumption is only about 1/4th of the recognized standards, while not a single definite case was noticed at Barasat or Calcutta survey. Practically all the cases of Bitot's spots gave also a history of night blindness.

A C H index

The selection is correlated with the economic status, being highest in Dinajpore, and lowest in Calcutta. But in a previous survey (Wilson *et al.*, 1937), the index appeared not to be applicable to different economic classes at Calcutta.

Summary

A diet and physique survey was carried out among several agricultural families at Dinajpore (North Bengal) and Barasat (24-Parganas) and some well-to-do families at Calcutta.

The diet of the well-to-do appears to approximate in most respects to the European standards. The diet of the agriculturists is deficient in animal protein, total and animal fat, total calories, calcium and vitamin A.

Better growth in physique is definitely found to be associated with better food.

Association between caries and enlarged tonsils and diet is not apparent, though phrynodermia appears to depend on deficiency of vitamin A and fat, either singly or both, and Bitot's spots is definitely associated with vitamin-A deficiency.

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THE DRUG INDUSTRY IN INDIA AND ITS DIFFICULTIES*

By R. N. CHOPRA, C.I.E., M.A., M.D., Sc.D. (Cantab.),
F.R.C.P. (Lond.)

BREVET-COLONEL, I.M.S.

*Honorary Physician to the King,
Director, School of Tropical Medicine, Calcutta*

It is a matter of satisfaction to me, who has been associated with the drug industry in India from the scientific side for the past two decades, that appreciable progress has been made during recent years. India abounds in medicinal plants and the existence of many possibilities of drug manufacture in this country emerges clearly from the fact that foreign manufacturers draw their supplies of much of the raw materials from this country. The root cause of the traffic in adulterated drugs was traced by the Drugs Enquiry Committee, on ultimate analysis, to the demand for cheap medicines in this vast continent. Some unscrupulous manufacturers in India and abroad have not been slow to exploit this and, in the absence of restrictive laws, a certain class of manufacturers and dealers has been successfully flooding the market with an inferior grade of products. The true remedy for this state of affairs lies in the organization of the drug industry in this country, which would be able to satisfy the conditions which might be prescribed by properly considered drug-control legislation, and to put on the market standard goods which would suit the purchasing capacity of the people whose economic condition is low. The question of stimulating the manufacture of drugs in India and that of ensuring the supply of pure medicine of proper standard, at prices commensurate with the means of the people, are inter-dependent. A perusal of the sea-borne trade statistics of British India shows that India imports medicinal drugs and preparations, pharmacopœial and otherwise, to the extent of nearly two crores of rupees every year while the value of drugs exported is comparatively very small. This means that while much raw material is going out of the country, considerable quantities of refined preparations are coming in. Many of the imported drugs are standardized pharmacopœial preparations such as galenicals and purified alkaloids, in many cases manufactured from the crude drugs which have been exported.

Thanks to the pioneer efforts of men like Sir P. C. Roy and others, manufacture of medicinal drugs in this country has progressed during recent years. Twenty years ago only a few firms manufacturing drugs existed in India, now there are quite a large number of reliable drug manufacturers in different parts of the country.

Calcutta alone can boast of at least half a dozen large factories, if not more, which would be an asset to any country. Formerly, a considerable proportion of this business consisted in diluting extracts of drugs imported from Europe and America; but now most of the drugs are manufactured in this country. Few only of the drugs indigenous to India were used in the manufacture of galenicals; but now most of the firms use indigenous raw materials. Mineral acids, inorganic and organic metallic compounds, alkaloids, glucosides and essential oils, proprietary medicines and medicinal specialities similar to those imported, are being manufactured. Even biological products such as gland extracts, sera and vaccines, etc., of good quality are being prepared, though on a very small scale considering the requirements of this vast country.

While a lot has been done, much still remains to be accomplished and there is considerable room for expansion in many directions. This is evident from the figures of imported medicinal preparations to which I have just referred and which include, not only special preparations but considerable quantities of galenicals, powders and extracts, about the manufacture of which there can be no possible difficulty. I have been studying this problem for many years and the reason for the existing state of affairs to my mind is that the indigenous manufacturers of drugs have not yet gained the full confidence of the medical profession in this country. Many practitioners insist on using even the ordinary galenicals prepared by reliable firms abroad, which so to say have a hall mark of quality and strength, in preference to indigenous articles however good they may be. The presence in the market, of medicinal preparations of an inferior quality, manufactured by firms of doubtful integrity side by side with good ones, has made them suspicious, and rightly so. While there is no doubt that manufacturers of inferior drugs exist both in India and abroad, there is one important thing which is not fully appreciated by the profession here and that is the effect of climatic conditions and storage, such as are met with in this country, on the medicinal preparations, and about which very little information is available at present. It must be remembered that these conditions affect both the preparations which are manufactured in India and abroad, however good they may be to start with. The effect of climate and storage is no doubt much more marked on some preparations than on others, but it has been conclusively shown that the potency of a number of the important preparations is materially altered in such a way as to be of serious significance to those who use them. I have watched many preparations of ergot and digitalis which had been properly standardized and were of the required strength when they left the factory, but within a few months they lost a considerable amount of their potency and became of below standard. This has naturally been a source of

*Being an address delivered at the opening of the Exhibition in connection with the Campbell Medical School Annual Reunion on the 14th January, 1939.

considerable anxiety to the manufacturers, both in India and abroad, as these factors apply equally to imported and indigenous preparations made by the best of firms. The fault does not lie with the makers but is attributable to factors yet imperfectly understood. One of the duties of the Drug Control Laboratories laid down by the Drugs Enquiry Committee is to work out the factors responsible for deterioration of medicinal preparations by climate and storage factors, and this is now being done by the Biochemical Standardization Laboratory which is the nucleus of the Drug Control Laboratory as visualized by the Drugs Enquiry Committee.

While such factors undoubtedly do exist, there is no denying the fact that on account of want of proper organization and lack of requisite knowledge of the intricacies of the problem of drug manufacture, the quality of indigenous products in some cases is not in keeping with the high standard that is expected. It should be realized that for the proper development of this industry the guidance by expert chemists, botanists, pharmacologists and bacteriologists is essential. Unless the development of this industry proceeds hand in hand with carefully planned research work, the progress will be extremely slow. In India unfortunately the rôle of scientific research in connection with the development of the drug industry is not fully appreciated and expenditure in this connection is often considered unnecessary and unjustifiable. This is in marked contrast to the attitude taken up by manufacturers and industrialists in

the Western countries. Large sums are set apart there for scientific research which is considered to be the pivot on which progress of the industry depends. A visit to the research laboratories of reliable firms of drug manufacturers such as Burroughs Wellcome in England, Bayer in Germany, Parke Davis in America, etc., will convince anyone of the supreme importance which is attached to this side and the part which activity in this direction plays in their success. Without the development of the research side it will be futile to expect any material progress.

Any scheme of drug manufacture in India, if it is going to be successful, should have the following objects in view:—(1) To supply the masses of India with medicinal preparations commensurate with their means. (2) To fight against preparations of impure quality and defective strength getting into the market. (3) All the basic material for manufacture of different preparations should be produced in the country and manufactured into a suitable form for administration and not imported from abroad, as is being done by many firms at the present time. (4) The importance of associating strong research units with the manufacturing organizations has not been sufficiently appreciated. Unless this is done the progress is bound to be slow and it will not be easy to improve the standard of preparations manufactured. (5) If 'quality and strength' is made the motto of the manufacturers, success will be assured and difficulties which undoubtedly exist will be overcome.

Medical News

SOCIAL SERVICE AND TUBERCULOSIS

*A statement issued by the King George V
Anti-Tuberculosis Fund Executive*

PROPAGANDA connected with the successful King-Emperor's Appeal for funds has not only instructed the people of India as to the vastness of its tuberculosis problem, but it has also carried with it the message of hope that the disease can be prevented and that a great many of those who do suffer from the disease can be cured if treated properly. It has been estimated that not less than two million people are suffering from active tuberculosis in the whole of India. This number is so huge that for many years to come modern institutional treatment can be available for but a small proportion of the sufferers, and for the great majority of them treatment must be provided in their homes.

This is one of the reasons why those responsible for the technical planning of the tuberculosis effort in India have put the establishment of tuberculosis clinics, in suitable centres, throughout the country, in the forefront of the campaign against the disease. These clinics will be centres where those suffering from the disease, and private practitioners treating tuberculous patients can obtain expert advice in order to make home treatment as efficient as possible, under the circumstances.

The character of the tuberculosis clinic will largely depend on the needs of the local community and on the funds available. The minimum requirement will be a place for the reception and examination of patients,

and for treatment which in some cases may have to be given in the clinic; there must be a tuberculosis doctor and one or more specially trained tuberculosis health visitors attached to the clinic. But, if the work of this technical staff is to be of the greatest possible value, it must be supplemented and supported by an organization for social service, namely, a 'care and after-care committee' of voluntary workers.

2. To a great extent tuberculosis social service in India is an 'unblazed trail', and the committee of each clinic will have to embark upon its own explorations of discovery, guided by the work that has been and is still being done by pioneers. There must be few parts of India, however, where there is not a great sympathy for sufferers from the disease, at least in the many families who have had personal experience of tuberculosis among their own relatives, and from among these sympathisers there will naturally be those who will be ready to help in voluntary service. To enlist these people in a 'help or care committee' should be one of the earliest thoughts of those responsible for the work of a clinic. This committee should, of course, include the tuberculosis doctor, and, possibly, one or more of the tuberculosis health workers connected with the clinic, but the Secretary should not be one of the technical staff. It is essential that in forming the committee there should be chosen as members not only those who can give their time and energy in personal service to tuberculosis patients and their families, but also those who can influence the public, create confidence and obtain support, on account of their own keenness, interest and sympathy. The whole

of the work of this committee is a contribution of social service in connection with tuberculosis.

3. Social service as applied to the tuberculosis patient is not easy to define, specially as it is so varied in its expression, but in general it can be summed up as 'a study of the social condition of the patient with a view to bringing the knowledge gained therefrom to the help of the patient, both to hasten and safeguard his recovery and to prevent the spread of the disease to others'.

The work of the 'care committee' will be concerned with two groups of patients, although the line between these two groups is not very sharp. There will be many patients too poor to pay for their own private doctor or for their treatment and who, therefore, will have to be helped from the clinic. The clinic doctor and nurse will have to visit these patients in their own homes, specially when they are not able to come to the clinic. Assistance from members of the care committee will be invaluable to the doctor and nurse, in caring for the social needs of these patients, without which care much of the medical help would be wasted or useless.

The other group will be those patients who can pay for their medical aid or even for their own doctor, and it is important to enlist the aid of the private medical practitioners in such cases. The clinic is not meant to compete with the private practitioners, but is there to help them in every way possible, by giving free, expert advice which can best be provided if the private practitioner keeps the clinic informed of the progress of the patients treated by him in their own homes. With these patients the work of the care committee is different; it should promote the co-operation of the local medical practitioners with the clinic, with a view to the control and prevention of tuberculosis in the whole area. This co-operation is a matter of supreme importance, if the tuberculosis scheme is to be successful. The care committee can also provide for many of these patients various forms of service or help which they would be glad to avail themselves of, and which might be difficult to obtain otherwise, in spite of their ability to pay for their doctor and their treatment. All the work of the care committee for this class of patients must be done with great tact and with the full knowledge and co-operation of the private practitioner.

For some patients, who are too poor to pay for their own doctor, the care committee may, under certain circumstances, such as distance from the clinic, arrange for treatment in their homes by private medical practitioners, paying such doctors a small fee for their services.

The care committee can also strive to bring into contact with the clinic or private medical practitioners, any patients who have not yet come under medical advice, because such contact is necessary if tuberculosis is to be stamped out.

4. For the carrying out of the work of the care committee, it must have sufficient financial support. But money for social service should never be provided from the general funds of the clinic intended for the staff and medical work, and an important function of the care committee will be to raise subscriptions from the public for its particular work. Such support will readily be given if there is evidence of useful work by the committee, as part of the Clinic's activities, in fighting the disease and in making it safer to live in that locality. The care committee will maintain its own fund with its own honorary treasurer, who, like the secretary, should not be one of the technical staff of the clinic. While it is not possible to define all the uses to which the funds of the committee should legitimately be put, the following may be suggested:—

(i) Giving relief to poor patients, after the committee has, by personal investigation, found such relief is necessary.

(ii) Payment for transport of patients to clinic, hospital or sanatorium.

(iii) Provision, in special cases, of medicines, and medical necessities, which though considered necessary

by the doctor, cannot, because of their cost, be provided by the clinic or the patient.

(iv) Payment of x-ray charges for poor patients, when the clinic has not its own x-ray, but can get such work done by a local hospital on payment.

(v) Provision of extra nourishment on the recommendation of the clinic doctor.

(vi) Provision of other place for treatment of a patient for whom treatment is impracticable in his own home, due to unhygienic or overcrowded conditions, and for whom institutional treatment is impossible to obtain.

(vii) Provision of other place of treatment, as a preventive measure, for a patient who is a dangerous source of infection, if he is left in his own surroundings.

(viii) Provision of aid for families whose natural supporter is sick, whether in the home or in hospital or sanatorium.

(ix) Arranging for the care and, if necessary, boarding out of children, if the mother is sick.

In addition to forms of service requiring money, there are many forms of service which the members of the committee may undertake, without expense, such as personal visits of the sick, providing literature for those who can read, and small personal services, too many to describe in detail.

5. The social service of care committees so far mentioned has been to patients while they are actually suffering from the disease. There is, however, one other not less important function of the care committee, and that is, the care for those who have been under treatment and have been considered fit to return to a more or less normal life. This function is usually styled the after-care of the patients.

The committee should make it their concern to help such ex-patients, specially during the first dangerous years after their illness, when there is, in many cases, the risk of a set-back, which would undo all the benefit of their treatment. The after-care of such patients would include the finding of suitable employment, according to medical advice. The employment may be their old occupation, either whole or part-time, or it may be a new one more suitable to the health and strength of the ex-patient. In many cases it will mean enlisting the sympathy of the employer, and if the ex-patient cannot work whole-time, to get the employer to give part-time or light work, and so to make this his contribution of social service to the tuberculosis scheme.

For some ex-patients, the committee may be able to start them in a new way of making their living independently, and if necessary, provide the training for the new occupation, such as small cottage industries, bee-keeping, or petty trades.

The above are some of the ways in which the care committee can help the fight against tuberculosis, either by their own efforts or by the aid of collected funds. With experience, their scope and usefulness will undoubtedly grow.

In conclusion, it must be emphasized that the care committees should not work as isolated branches of the tuberculosis scheme, but always in close co-operation with the clinic and private practitioners co-operating with the clinic. Only then will the social service they render play the fullest part in the combating of tuberculosis in their midst and so be an effective help in the whole campaign in India.

THE TUBERCULOSIS ASSOCIATION OF INDIA

Policy of Central Association

ONE of the first duties of the new Central Association will be to decide, in general outline, the methods which it will use to carry out its task of dealing with the All-India tuberculosis problem. While the constitution for the Centre has been liberally designed in order that every use may be made of any recognized activity able to influence the prevention or cure of the disease, the active campaign, i.e., the creation of hospitals or clinics, and carrying out of preventive measures, must primarily be the responsibility of the provincial state association. The deciding factor in

formulating its policy will therefore be the relationship of the provincial state associations which are independent bodies, governed by constitutions of their own. The Centre can exercise no controlling influence over the affiliated associations, but should organize itself so as to be in a position to offer expert advice, and to become a co-ordinating agency, e.g., in standardizing methods, in promoting consultations or conferences, in training workers and in educating the public by different forms of propaganda. The promotion of research will be another important function, while its work will be assisted by the formation of an information and statistical bureau and by the publication of an All-India tuberculosis journal. It is, therefore, evident that the Central Association has a most important place in the whole tuberculosis effort, especially as it is hoped that the provincial state associations will co-operate in order to form a united, co-ordinated and efficient general campaign against the disease.

The main work of the Centre will be controlled by a general committee, delegating work to different sub-committees, of which the most important will be a technical or medical sub-committee. It is assumed that similar organizations will be created by all the larger affiliated associations, at least.

The Technical Adviser. It will be necessary to make this important appointment at a very early stage. At the present time, there are comparatively few experienced expert workers in India, but this post must be filled by a medical officer whose experience and standing is such that his advice will carry weight and influence with provincial and other associations, to which his services will always be available.

It is desirable to consider the various functions of the Centre as indicated above in greater detail.

1. Advisory functions

The advisory functions of the central committee will be many. It must be prepared to offer general advice with regard to the tuberculosis policy and detailed advice with regard to location, construction, equipment, staffing and functions of tuberculosis clinics and other tuberculosis institutions. Advice should also be available with regard to propaganda, education or training of tuberculosis doctors and other tuberculosis workers, research, care and after-care organization, the place of private practitioners in local schemes, etc.

2. Co-ordinating functions

Duplication of effort should be avoided; propaganda material, for instance, produced either by the central or provincial association should be made available throughout India by the centre. Methods of training, specialized medical education, standardization of buildings, forms and hospital organization should be communicated. A valuable method of assistance in these matters and of bringing workers in touch with new methods will be by

(a) promoting conferences of tuberculosis workers,

(b) propaganda; by producing special material for distribution throughout India, the Centre will be carrying on an activity which has all along been used with effect by the King George Thanksgiving (Anti-Tuberculosis) Fund. In this matter the continued co-operation of the Red Cross Society will be valuable.

(c) *Training and education.*—This has been another successful activity of the King George Thanksgiving (Anti-Tuberculosis) Fund. Until each province has developed its own training centres, the central committee might arrange courses of training of shorter or longer duration, using experts from different parts of India, with a view to increasing the number of tuberculosis workers for the many institutions which will be required in the near future. Delhi itself would be an excellent centre at which doctors might receive special training. In addition, the institution of a special course and the granting of a diploma for tuberculosis will be worth investigating. The Delhi hospitals and the special expert on the staff at the centre could co-operate to make such a training successful.

(d) *Research.*—Special investigation of tuberculosis problems is carried out at present by the I. R. F. A., who will no doubt continue to promote and assist such activities in so far as their finances permit. Not only will the central committee through its medical members and its expert adviser keep in touch with such work, but it will assist in communicating the results obtained to tuberculosis workers throughout India. The expert should be encouraged to carry out researches himself and the centre should also be in a position to arrange for financing such work.

(e) *Information and statistical bureau.*—The central committee should also arrange an information and statistical bureau, which will collect, analyze and distribute information on all tuberculosis matters not only for affiliated associations but for institutions, the medical profession, the press and the general public. Such a bureau will require a good library with proper arrangements for supplying information on any matters connected with tuberculosis.

(f) *Journals.*—Part of the co-ordinating work of the central committee will be publication of journals, such as an Association Journal, dealing with various activities in India and elsewhere and containing general propaganda material; possibly later on a medical journal for tuberculosis in India might be practicable.

Special tuberculosis institutions.—As noted above, the creation and maintenance of sanatoria, hospitals and clinics devoted to the treatment of tuberculosis are matters which will be dealt with by provincial state organizations. Although the centre by its constitution has the power to undertake such responsibilities it will not do so immediately. It may however be necessary later to organize and support model institutions in Delhi in connection with its educational and research responsibilities. These should be designed to meet the necessary special requirements.

FINDINGS IN NUTRITION SURVEY

THE richer you are the more fat you eat. Investigations under a scheme approved by the Nutrition Advisory Committee of the Indian Research Fund Association have shown that a special feature of the Indian diet is a marked increase in the consumption of fat with the rise in economic scale.

Four types of communities in different areas were selected for diet and clinical surveys, namely, industrial workers in Assam (the coolie class), the middle class agriculturists in Bengal, the well-to-do Calcutta households and a mixed middle class community in Ferozepore, Punjab.

The diet of the Assam coolies was found to be poor in total calories, in total proteins, in fat, in calcium, in vitamin A and in carotene, also to a lesser degree in vitamin C and in iron. Most of the families took no milk. Conditions were somewhat better among the middle class agricultural group though the fat and the animal protein consumption was low. The diet of well-to-do people in Calcutta was almost as good as that recommended in the European standards.

Children examined

Together with the diet surveys, the children were examined for height, weight and deficiency diseases. The heights and weights of the Assam children were much below those of the well-to-do group in Calcutta and those of the rural children were midway.

While the absolute gain in weight per year was somewhat greater in the Calcutta children, growth expressed as a percentage increase in body weight per year was actually greater in the labour class in Assam. In spite of the poor diet the growth impulse appeared to be as good amongst this class as among the well-to-do. They had also probably a greater proportion of muscle tissue per unit of body weight than the better-off group.

These surveys show that Assam coolies live on a diet which is inadequate qualitatively and probably also quantitatively. To a lesser extent it is also true of the agricultural community in Barasat, Bengal, yet the inherent vitality, as judged by the percentage rate

of growth and grip per lb. body weight, appeared to be good.

Definite signs of vitamin-A deficiency in the diet were seen only in Assam, the rural area in Bengal and Calcutta being exempt from them. Mal-occlusion of teeth, of which the cause is obscure, was most common among the Assam children (23.2 per cent) and least in Calcutta (8.0 per cent). On the other hand the incidence of enlarged tonsils was greater among the well-to-do (42.3 per cent) and least among the coolies (12.8 per cent). Conditions of malnutrition were present amongst 38.7 per cent of boys in Assam and amongst 33.8 per cent in rural Bengal, and 16.3 per cent in Calcutta. These figures, however, fell with the rise in economic status.

The average number of children alive per family was 1.8 in Assam, 3.5 in rural Bengal, and 4.2 in Calcutta. In none of the groups were children sent away elsewhere; indeed in Assam they obtained employment in the industry from the age of seven.

Better diet in Punjab

The families surveyed in Ferozepore, Punjab, included Hindus, Muslims, Sikhs of the artisan class, and a small group of sweepers. The diet of this mixed group was almost as good as that of the well-to-do people in Calcutta in calories, proteins and fat. Even the sweeper class were on a much better diet than the Assam coolies. Their main cereal was wheat and the quantity of milk available for consumption was about 8 oz. per head per day. In spite, however, of their better diet, particularly as regards calcium, the incidence of caries was over 30 per cent. The number of those with enlarged tonsils was also high. The average heights and weights of the children were above those of the Assam and rural Bengal groups.

An increase in the cultivation of green vegetables and consumption of dāls among the poorer classes, it is said, would be a cheap and simple expedient at least to prevent the appearance of xerophthalmia.

NUTRITION OF INDIAN POPULATION

THAT the lowest production and consumption of milk and milk products is shown by Bihar and the Central Provinces and the highest by the Punjab, and that only a fifth of the total population of India obtains the minimum physiological requirement of milk and its products, are among the facts revealed in investigations financed by the Imperial Council of Agricultural Research to obtain precise information on the production and consumption of milk by Indian cultivators, so that measures may be adopted for better nutrition of the population through a proper breeding policy.

Effective optimum

The enquiry was conducted on the suggestion of H. E. Lord Linlithgow whose dictum is that 'any race of men must be below par in direct ratio as the consumption of milk by the child, and to a great extent (particularly in a country of deficiency diets) by the adult, falls below the effective optimum'. He points out that the breeding policy which is recommended to cultivators should aim at producing a cow which yields enough milk to rear a good calf and to provide a sufficient margin for human consumption. The enquiry embraced the consumption of not only milk but also of other dairy products and the tracts selected were those where working bullocks were also produced.

The provincial governments co-operated in working the scheme. The villages and holdings in each specified area were selected at random according to the statistical principles explained in the Bowley-Robertson report. The questionnaire was designed to ascertain as much information as possible regarding the cattle bred and maintained in each area and the production and consumption of milk. And subsidiary tables were supplied to record the large amount of data.

Village conditions

The enquiry was to be conducted within a period of three months in over 50 to 60 villages in each area, by a staff of one supervisor and ten investigators for each area. In view of the enormous amount of work on the programme, the advisory board extended the period to five months. On an average twenty holdings were chosen in each village and the investigator had to stay in each holding for seven consecutive days recording the yields of milk of each cow and buffalo and noting its disposal. The supervisors were mostly selected from the permanent staff of local governments who have had experience of livestock work. Investigators were generally those relieved from the enquiry regarding cost of cultivation, an extensive scheme financed jointly by the Imperial Council of Agricultural Research and Indian Central Cotton Committee. The staff thus had some previous experience of conducting such work. The total cost of the scheme for the seven areas was approximately Rs. 25,000.

Supervisors were given practical training at Delhi before the enquiry was actually started. Prior to starting actual work each supervisor called together the ten investigators under him and imparted a course of instructions similar to that he had received in Delhi. After the field enquiry was complete the supervisors again assembled in Delhi, where the collected data were scrutinized and all calculations checked. The reports submitted by the supervisors were then scrutinized by the provincial directors concerned.

Thus the data collected are actual records of cattle living in village conditions. They are closely in agreement with the figures obtained in the survey conducted by Major-General Sir John Megaw for the whole of India and the personally controlled survey conducted by Dr. D. C. Wilson of the food habits of 30 urban and 30 rural families in the Sialkot District.

Consumption differences

The Montgomery Tract records the highest consumption of milk and milk products, namely 15.53 oz. per head per day. Hariana and Kankrej follow with 12.39 and 12.07 oz. respectively. Kosi consumes 9.71 oz. and Ongole 8.73 oz. Central Provinces and Bihar are at the bottom (as they are in production) with 6.73 and 5.51 oz.

Considering the seven tracts together 16 per cent of the families in India do not receive any milk or milk products, 36 per cent consume the equivalent of between 0 and 8 oz. milk per head per day, 26 per cent between 8 and 16 oz. and the remainder or 22 per cent receive over 16 oz. Assuming that the minimum physiological requirements of the people, large proportion of whom is vegetarian, are between 15 and 35 oz. per head per day the proportion of families which obtain this quantity is only a fifth of the total. This figure represents only the important breeding tracts and not the whole of India. Since breeding tracts should be expected to produce and consume more the all-India consumption is likely to be less.

No consumption of milk

Kosi shows the largest proportion which does not consume any milk or milk products, the percentage of non-consumers being 32.2 per cent or about a third of the total. The lowest proportion of non-consumers is in the Kankrej tract where there are only 5.9 per cent who do not receive any milk or milk products. The other areas are in the following order: Hariana, 6.9 per cent; Ongole, 9.9 per cent; Montgomery, 13.1 per cent; C. P., 21.7 per cent; and Bihar, 23.2 per cent. Ongole, Bihar and C. P. are below and Kankrej, Kosi, Hariana and Montgomery are above the all-India average proportion of 22 per cent which receive the minimum physiological requirements of milk and milk products. The model consumptions in the different areas also vary.

The above figures of total consumption of milk and milk products do not include skim-milk (*lassi*), figures for which also are given in the Council's Bulletin no. 22.

Milk yield

The highest average for cows is in Montgomery with 4.72 lb. per day in the seventh month of lactation, the Ongole cows follow with 4.61 in the sixth month and then comes Hariana with 4.46 in the fifth month. The differences between these are not, however, large and it may be safely stated that these three are approximately at the same levels of production, yielding 4 to 5 lb. per day on an average. Cows in Central Provinces are the poorest yielders, their yield being only 1.67 lb. or a little over a third of the Montgomery cows. Kosi and Bihar are between these two extremes, the former (3.89 lb.) approaching the Hariana and the latter (2.74 lb.) approaching Central Provinces.

In the case of buffaloes the order of merit is different. The Hariana tops the list with 11.21 lb. per day. Montgomery and Kankrej which follow with 8.24 lb. and 7.97 lb. respectively are only about 75 per cent as good as the Hariana. The next respectable yields are Kosi 7.06 and Ongole 6.53 lb. Bihar and Central Provinces are again at the bottom with only 5.4 lb. each per day. Generally speaking, these two areas are the worst in point of milch animals.

The large majority of cows in India, or 63.3 per cent of the total, yield less than 4 lb. of milk per day, 30.8 per cent yield between 4 and 8 lb. and only about 6 per cent yield more than 8 lb. Amongst buffaloes the low yielders form only 19 per cent while 66 per cent yield between 4 and 12 lb. per day and 15 per cent over 12 lb.

Interesting data on the consumption of milk and different milk products separately by the two sexes and at different ages, the relation between production and consumption of milk, the rate of decline in milk yield, proportion of cows and buffaloes in milk, and the size of holdings, number of work animals, milch animals and dependents per holding, are included in the Bulletin.

The Council's Advisory Board has accepted and the Governing Body has approved of the Standing Breeding Committee's recommendations designed to secure better supply of fodder, better organized marketing for live-stock and milk and milk-products laying down a breeding policy so as to increase milking capacity of females of draught breeds and urging efforts for the production of milk cheaply in India.

SURVEY OF NATIONAL NUTRITION POLICIES, 1937-38

THE work of the League of Nations on the problem of nutrition, which has already created such wide public interest, has now been carried a stage further by the publication of a book of 120 pages, entitled 'Survey of National Nutrition Policies, 1937-38'. This study is of interest not only to those directly concerned with the problem of nutrition but to the general public of the various countries covered. It is written in a style which is readily comprehensible to the ordinary man or woman.

The Survey opens with a chapter on the progress of the work of the League in regard to nutrition problems. In addition to examining a number of technical questions, it is shown that the Technical Commission on Nutrition has given practical help to Governments. It has, for example, furnished advice in regard to the planning of a minimum emergency diet for the feeding of refugees in Spain.

In Chapter II, concerning National Nutrition Committees, the creation of which was recommended by the League, it is pointed out that such committees now exist in over twenty countries. Only three committees were in existence when the League enquiry started.

A chapter on the most suitable methods of making nutrition surveys is followed by another which is of special interest, since it gives details regarding the surveys undertaken and the results obtained in various countries. There is a section of several pages on the United Kingdom, where extensive surveys are now

being carried out. It will be recalled that these were referred to by the Prime Minister in his speech in the House of Commons during the debate on the Address on 8th November last.

Australia is another country about which particularly interesting information is given, and there are also sections on other British countries—New Zealand, Canada, South Africa and India.

This chapter is full of illuminating facts about food habits in various countries. It is stated that, in an enquiry in the United States among the families of wage earners and clerical workers, from 40 to 60 per cent of the diets of white families in four regions were found to be in need of improvement. In Hungary, it has been found that, if exports are to remain unchanged and if requirements are to be fully met, the present production of milk would need to be increased by 120 per cent and of eggs by as much as 470 per cent. In Bulgaria the peasant is said to be definitely underfed during the busy agricultural seasons, while the bread which provides 79 per cent of the total energy value of his diet, is often unfit for human consumption. An enquiry in Norway showed that 53 families out of a total of 301 did not use any whole milk at all during the four weeks of the investigation. A good many villages of Yugoslavia observe practically all the Orthodox fasts, which may amount to as many as 206 days in the year. These are only a few of the facts brought to light in chapter IV, which deserves to be read by the intelligent layman who wishes to keep abreast of the problems of our times.

Chapter V, on Special Research, is of interest principally to experts, but the following one, dealing with action taken to improve nutritional standards, can be read and appreciated by all. It contains a brief description of the numerous measures taken in various countries to increase the consumption of milk, to provide cheap food to the poor, to feed school children, to improve the nutrition of mothers and young children and so on.

In the next chapter, reference is made to certain of the economic aspects of the nutrition problem. It is suggested—and a striking illustration of this from Hungary is given—that measures of relief only touch the fringe of the problem, and the Survey indicates other possible measures for making good dietary deficiencies.

In the concluding chapter, the steps taken to educate the public in various countries are described. Much can be accomplished by means of education and publicity since, as the Survey points out, 'it is surprisingly common to find relatively well-to-do sections of the population living on poor diets when, for an expenditure within their means, they could, by the wise choice of foodstuffs, obtain all the constituents of a good diet in sufficient quantities'.

This Survey is an example of the type of work in which the League has already had considerable success. There is brought together in one small, readable volume a mass of facts collected from official sources in a large number of countries. It is not merely a work of reference but also a document in which even experts can learn what is being done in other countries than their own. Such a dissemination of knowledge and ideas is of real and immediate practical value.

MATERNAL MORTALITY ENQUIRY IN CALCUTTA

THAT in 96.3 per cent of maternal deaths investigated there was an avoidable factor present is one of the findings which has been put forward, as the result of a statistical inquiry into the causes of maternal mortality lately carried out in Calcutta for a period of one year by the All-India Institute of Hygiene and Public Health with a grant from the Indian Research Fund Association.

Cases of maternal deaths were collected from all female deaths between 10 and 50 years registered in the area under the control of the Health Officer, Corporation of Calcutta. Duplicate registration cards were supplied in the case of all female deaths between these

ages and on these duplicates information was provided regarding the existence of pregnancy or the puerperal state. Considerable care was taken to ensure that duplicate registration cards were received in all cases, but questions relating to pregnancy were not answered in every case. Complete accuracy is not, therefore, claimed for the series of maternal deaths.

Causes of death

Each maternal death was followed up by home visits, interviews with the doctor, midwife or *dai* who attended at the time of delivery, or visits to the institutions in which treatment had been given. The information collected was in most cases sufficient to make it possible to reach a conclusion regarding the probable cause of death and the contributory factors, and also regarding the preventability of the death. But in some cases, these conclusions were largely conjectures based on the statement of relatives, for in 11 per cent of the maternal deaths investigated no trained person had been in attendance.

Eight hundred and eighty-seven maternal deaths were investigated, of which 701 were found to be due directly to child-bearing and the rest, 186, due to diseases associated with child-bearing.

The following is a list of causes of deaths due directly to child-bearing:—

		Per cent
1. Septic abortion	33	4.71
2. Abortion (non-septic) ..	4	0.57
3. Ectopic gestation	6	0.86
4. Other accidents of pregnancy	7	1.00
5. Puerperal haemorrhage ..	74	10.56
6. Puerperal sepsis	224	31.95
7. Puerperal alb. and convulsions	126	17.97
8. Other toxæmias of pregnancy	15	2.14
9. Embolism and sudden death ..	11	1.57
10. Other accidents of child-birth	26	3.71
11. Other or unspecified conditions of the puerperal state ..	10	1.43
12. Anæmia	165	23.53

Puerperal sepsis, anæmia and eclampsia stand out as the most important causes of death due directly to child-bearing in Calcutta, while pulmonary tuberculosis was responsible for 40 per cent of deaths from diseases associated with child-bearing.

Anæmia

The importance of anæmia was greater than appears from the table, for in addition to those deaths from anæmia *per se*, there were many others, specially in the sepsis group, in which anæmia was an important contributing factor. Very little information was forthcoming regarding the ætiological factors and the types of anæmia responsible for this mortality. A further enquiry was accordingly undertaken with the object of collecting information regarding factors which cause anæmia, *e.g.*, diets, economic conditions, purdah, personal history and associated diseases, in a series of moderately and severely anæmic women attending the welfare centres, maternity homes and antenatal clinics in Calcutta. It is hoped to discover, by means of blood examination at intervals in pregnancy and after delivery, the types of anæmia which occur and the effect of pregnancy and lactation on the course of the anæmia.

It has been found necessary to collect a control series of specimens of blood from healthy Indian women in order that the normal range of absolute values may be available for comparison. The findings so far collected suggest that the blood of healthy Indian women conforms to accepted European hæmatological standards.

Ætiological factors

Each case of anæmia and pregnancy needs to be followed up for several months and a large number of cases must be collected before any conclusion can be drawn regarding the influence of ætiological factors.

In 161 antenatal and 12 puerperal women examined there were 77 cases of macrocytic anæmia, 41 cases of

microcytic anæmia, and 55 cases of normocytic anæmia. Of the 77 cases of macrocytic anæmia only 23 were hyperchromic, the remaining being normo- and hypochromic according to European standards.

There were 40 cases of severe anæmia and of these 18 were macrocytic, 12 microcytic hypochromic and 10 normocytic normo- or hypochromic. The 18 macrocytic cases included only 7 with hyperchromia, the remaining being normo- or hypochromic according to European standards. In the series of 18 severe macrocytic anæmias there was a history of malaria in 6 cases although no parasites were found in any case. The spleen was enlarged in 10 cases and an indirect positive van den Bergh reaction was obtained in 12 cases.

CURRENT ACTIVITIES OF THE HEALTH ORGANIZATION OF THE LEAGUE OF NATIONS

The Far Eastern Bureau of the Health Organization

THE main function of the Bureau which the health committee set up in Singapore in 1925 is to keep permanently in touch with port health authorities in Eastern and Far-Eastern countries, and give immediate warning, by the swiftest available means, of all epidemic outbreaks involving a risk of contamination for the outside world. Every week, the Bureau's epidemiological communique is issued and broadcast by nine wireless stations; each of these messages, until superseded by the next, is repeated daily by the powerful station at Malabar (Java). It can be picked up at any point in the Indian Ocean and the Western Pacific, in the Mediterranean basin, and as far as the Atlantic coast. The information broadcast is constantly brought up to date.

A difficulty arose at the end of 1937, when the Bandoeng, Saigon, and Antananarivo stations gave up long-wave transmission. As a result of this, some health authorities in the Near East, on the East-African coast and in Australia were unable to pick up the message.

To meet this difficulty, the Radio-Nations station at Geneva will broadcast once a week. It will be transmitting every Friday, beginning on 10th February at 8-40 a.m. G. M. T. on wavelengths of 16.23 and 20.6 metres. This arrangement has been made in consultation with the ports concerned, but is merely tentative and subject to modification if circumstances require.

There is another aspect to the work of the Singapore Bureau, considered as part of the machinery of the Health Organization; this consists in promoting practical co-operation between public health services in the East, and between institutes engaged in research.

Thus, it devolves upon the Bureau to help forward and co-ordinate the action taken upon the recommendations of the 1937 conference of Far Eastern Countries on Rural Hygiene held in 1937.

Information supplied to the advisory council of the Singapore Bureau in November 1938, shows that the Netherlands Indies, French Indo-China, Malaya, the Philippines and Siam are now undertaking in a number of typical districts the surveys recommended by the Bandoeng conference, enquiring into the actual state of the public health, the factors affecting it, the health equipment and the working of the various health agencies. The Singapore Bureau will keep in touch with those countries, supply them with information, and endeavour to secure as much uniformity as possible in the presentation of the findings.

The Philippine authorities have recently set up a nutrition institute which is to concentrate on experimental research. India possesses a similar institution: the Nutrition Research Laboratory at Coonoor, Australia, French Indo-China, the Fiji Islands, New Zealand and Siam have also started research institutions dealing exclusively with problems of nutrition. In this way, effect is being given to a further recommendation of the 1937 conference, which after emphasizing the importance of nutrition as a

health problem in eastern countries stressed the need for dietary surveys undertaken in collaboration with the Technical Commission of the Health Organization. Since 1938, two new members representing technical institutions in Far-Eastern countries have been added to this body, which will have to co-ordinate an extensive programme of work in that part of the world.

Unification of pharmacopœia

The potential value of the creation of a limited international pharmacopœia has long been realized by medical men and is frequently brought home to the individual patient by the difficulty he experiences in getting his prescriptions made up when abroad. The same problem exists with regard to the treatment of ships' crews calling at different ports and the replenishment of ships' medical chests.

From the academic point of view, the existing variations in the strengths and composition of medicinal preparations in different national pharmacopœias add an unnecessary complication to the investigation of the comparative results in drug therapy of the same disease in different countries, and further tend to prevent the adoption of new methods of treatment by a country, even where these have proved valuable elsewhere.

Apart from the view of the practitioner, consideration must also be given to the manufacturer who, from one country, is supplying large quantities of drugs to the international market. The varying standards as to strength and particularly as to purity at present existing make it essential for a producer, either to limit his sales to his own country, or to manufacture a special preparation of the same drug for each country to which he is exporting.

The field of possible unification of pharmacopœias had already been explored by an International Conference meeting at Brussels in 1925, the outcome being a Convention creating an International Secretariat under the Belgian Government. In addition, the International Pharmaceutical Federation had worked along similar lines. A further step forward was taken in 1937, when, after agreement with the Belgian Government and in liaison with the International Pharmaceutical Federation, the Health Organization set up a Technical Commission of Pharmacopœial Experts. This commission met in Geneva during 1938 and prepared a programme of studies, including the selection of suitable drugs for examination.

The commission further considered and adopted standard forms of monograph for use in preparing the drafts, and decided to prepare general descriptions of reagents and analytical procedures, and statements of other general principles for the unification of monographs. The preparation of a report on maximum doses and on the possibility of defining average doses was entrusted to two members of the commission.

Finally, the members agreed to prepare a number of draft monographs on various drugs, 60 of which have already been received. The monographs will be subsequently considered at a meeting of the commission in May 1939, when the final form will be discussed and approved, and will then be forwarded to the Permanent Secretariat in Brussels for circulation amongst the signatory countries of the agreement, with a view to their ultimate adoption and final incorporation into a limited international pharmacopœia.

• ——— SNAKE-BITE

THE anti-snake-bite serum prepared by the Central Research Institute at Kasauli is now in demand in Burma, Iraq, Ceylon and Iran which amongst themselves bought 698 tubes in 1937. The general demand for the product continues to rise.

The product is a bi-valent serum prepared against the venoms of the Indian cobra and Russell's viper, which are the snakes probably responsible for the majority of deaths occurring from snake-bite in this

country. The increase in annual issues is shown by the following figures:—

				Tubes
1933	..	..	..	4,342
1934	..	..	..	5,973
1935	..	..	..	5,983
1936	..	..	..	7,170
1937	..	..	..	7,773

Further studies have been made on the methods of concentration designed to eliminate fractions which are not of neutralizing value and which tend to produce a deterioration in the physical characters of the serum when kept in the plains for prolonged periods during the hot weather.

Besides cobra and Russell's viper, the venoms of which are neutralized by the anti-venom serum, a snake which is responsible for a large number of deaths annually is the common krait. There would be no difference in principle in preparing an anti-venene for the venom of the snake, but practical difficulties exist in immunizing the horses used for the present bi-valent serum.

The chief difficulty is in obtaining a sufficient and constant supply of krait venom. The snake is difficult to keep in captivity and to feed, and so far no reliable source of supply of venom has been found.

BULLETIN OF THE HEALTH ORGANIZATION, VOL. VII, NO. 4

THE Bulletin of the Health Organization of the League of Nations (Vol. VII, No. 4) gives information concerning the activities of the organization.

Among other items, the volume contains two reports of outstanding interest. The first is a report by the Commission on Physical Education, drawn up at a meeting held in Geneva in July 1938. This report will repay study by all who are interested in scientific research relating to physical education. The commission suggests a programme of laboratory research on the physiological effects of physical exercise and on the relations between intellectual and physical development. In addition it enunciates some general principles for the use of those taking part in physical exercise and gives a draft examination form to be used for the medical examination of persons engaged in physical training.

The other report of particular interest is one dealing with certain technical aspects of nutrition. The question of the guiding principles to be observed in the study of diets and the nutrition of populations is specially dealt with, together with certain special considerations which should be taken into account in regard to nutrition in the Far East, in tropical countries and in colonial territories. Furthermore, attention having been drawn to the fact that there exist in Europe circumstances so critical as to necessitate emergency measures against famine, the authors of the report have suggested diets, very simple and inexpensive, but adequate to maintain life and to avoid severe malnutrition.

BULLETIN OF THE HEALTH ORGANIZATION, VOL. VII, NO. 5

THE Bulletin of the Health Organization of the League of Nations (Vol. VII, No. 5), which contains information concerning the activities of the Organization from August to October 1938, is specially devoted to the question of biological standardization.

This number reproduces an important report on the meeting of the serologists of the Permanent Commission on Biological Standardization held at Paris in October 1938. The report is accompanied by a number of annexes relating to tetanus antitoxin, anti-snake venom serum and gas gangrene antitoxins. The volume also contains studies on the international standard of vitamin B and the report on the Third International Conference on the Standardization of Hormones, held at Geneva in August 1938.

TROPICAL DISEASES BULLETIN

We have received the following announcement regarding the policy of the *Tropical Diseases Bulletin*:—

The broken continuity of the text in a collection of abstracts tends to make an abstract journal read like a dictionary, so that few people find that they get real satisfaction from its perusal. To overcome this disadvantage to some extent it has been decided, from January 1939 onwards, to preface each section of abstracts in the *Tropical Diseases Bulletin* by an introductory *précis* in connected narrative form of the abstracts which follow in the section. Thus a reader will be able to ascertain quickly and with ease from this brief narrative account the salient information contained in fuller detail in the individual abstracts which follow.

It has also been decided to issue in the *Tropical Diseases Bulletin* from January 1939 onwards a series of articles which will review the advances made in tropical medicine from year to year. This series of articles will bear the title "Summary of Recent Abstracts", and each article will give a connected account of the abstracts on a particular subject which have appeared in the volume of the *Tropical Diseases Bulletin* for the preceding year.

We cannot help feeling that these new features will enhance still further the popularity of this most invaluable publication.

UNIVERSITY OF CALCUTTA
NOTICE

Senate House, the 6th February, 1939

APPLICATIONS are invited from candidates for the 'Darbhanga Research Scholarship' for the year 1939.

The scholarship will be awarded for the purpose of encouraging original research in Medicine in its various branches, and all Graduates and Licentiates in Medicine and Surgery of the University of Calcutta are eligible to compete for the same. The value of the scholarship is Rs. 50 a month tenable for one year only.

The terms and conditions of the award of the scholarship will be found in the University Calendar for the year 1938, pages 269 to 270.

Applications with full particulars, as required under the rules, should be submitted so as to reach the undersigned not later than 1st May, 1939.

B. B. DUTT,
Controller of Examinations.

LONDON SCHOOL OF HYGIENE AND TROPICAL
MEDICINE

The Annual Malaria Control Course for Laymen (Engineers, Planters, etc.) will be held at the above address, commencing on Monday, 26th June, 1939, at 10 a.m.

(1) THE course will be under Sir Malcolm Watson and staff of the Ross Institute of Tropical Hygiene.

(2) The course lasts five days, and ends on Friday, 30th June, 1939. Except on Friday, 30th June, the lectures of the Malaria Control Course are given in the mornings only; but (in response to numerous requests from those who have attended in the past) additional afternoon lectures and demonstrations have been arranged on (a) water supplies, (b) conservancy and sewage disposal, (c) insulation against heat and cold, air conditioning for comfort in the tropics. The afternoon lectures and demonstrations will be given by Dr. G. P. Crowden and Mr. H. H. Clay.

(3) The course is designed for planters and mining engineers, but it will be of interest to all (including missionaries) who are proceeding to the tropics. Doctors may attend, but the course is primarily for laymen.

(4) It includes instruction on mosquitoes and their habits, drainage and other measures for the prevention of malaria. It is illustrated by lantern slides, films,

demonstrations of the living insect in the various stages of its history, and a practical demonstration on Hampstead Heath.

(5) The course is free. Application to attend the course should be sent in as early as possible to the organizing secretary at the above address.

(6) The most convenient underground railway stations serving the School are Tottenham Court Road, Goodge Street, Russell Square.

(7) Luncheon can be obtained at the school.

H. LOCKWOOD STEVENS,
Organizing Secretary.

HUNTERIAN SOCIETY

Gold Medal for Practitioners

Any registered general practitioner resident within the British Empire is eligible to compete, and the medal, which is of gold, is awarded annually to the writer of the best essay on a subject selected by the Society.

Competitors—men or women—must be engaged in general practice and essays should be sent in by December 31st.

The essay must be unpublished and original, and be based on the candidate's own observation, but it may contain excerpts from the literature on the subject, provided that reference be made to the articles from which they are taken.

A copy of the rules and any further information can be obtained on application to the Honorary Secretary, Mr. Alex E. Roche, 140, Harley Street, W.1.

The subject selected for the Essay is:—

1939. 'The Treatment of Obesity in General Practice.'

1940. 'The Treatment of Tonsillar Infections in Children.'

The 1938 Hunterian Gold Medal for General Practitioners was won by Dr. James E. Outhwaite, of Yeadon, Leeds, for his essay on:—

'The Management of Inoperable Malignant Disease in General Practice.'

THE TINNEVELLY DISTRICT MEDICAL ASSO-
CIATION, PALAMCOTTAH (TINNEVELLY
BRANCH OF THE INDIAN MEDICAL ASSO-
CIATION)

Monthly meeting

THE monthly meeting of the Tinnevelly District Medical Association was held under the presidency of Lieut.-Colonel T. S. Shastri, I.M.S., at the Government Hospital, Nanguneri, on Saturday, the 28th of January 1939. Members numbering 30 were present at the meeting.

The secretary and treasurer read the minutes of the annual re-union which was celebrated on the 3rd of December 1938, which were passed.

It was decided to invite Madura, Ramnad and Travancore Medical Associations to hold a joint meeting with the local association at the next monthly meeting at Palamcottah.

A resolution was unanimously passed congratulating the Honourable Dr. T. S. S. Rajan, Public Health Minister of the Government of Madras, on the passing of the Public Health Bill by the Madras Legislature.

Resolved that the Indian Medical Association should be officially recognized by the Government of Madras and that the orders may be issued that the association must be consulted on all important matters relating to public health and medical profession as well.

Dr. M. Vaidyanathan, L.M.P., of Nanguneri, showed a child of 3 years who is suffering from a very complicated state of congenital syphilis.

Dr. T. K. Nilakanta Iyer, L.M.P., read out the following cases, which were successfully treated at the Government Headquarters Hospital, Palamcottah:—

1. A case of acute abdomen.
2. A case of fracture of pelvis.
3. A case of myelitis.

The skiagrams relating to the above were demonstrated. Each case was fully discussed by the members.

Thereafter Lieut.-Colonel T. S. Shastri, I.M.S., summed up the salient and important features of all the cases and their differential diagnosis in detail. He offered his cordial thanks to Dr. M. Vaidyanathan, L.M.P., for the arrangements.

Thereafter an excellent dinner party brought the happy gathering to a close at 10 p.m.

Health exhibition

Under the auspices of the Timmervely District Medical Association in connection with the monthly meeting, a health exhibition was arranged at the Board High School, Nanguneri, on the 28th of January 1939 at 10 a.m.

Lieut.-Colonel T. S. Shastri, I.M.S., welcomed the guests and declared the exhibition open.

The exhibition was kept open till 1 p.m. The exhibits consisted of posters on tuberculosis, smallpox, fly danger, cholera, etc. The exhibits of the school were also exhibited.

ISTITUTO NAZIONALE PER LE RELAZIONI CULTURALI CON L'ESTERO

POST-GRADUATE MEDICAL COURSES IN ITALY

THE I. R. C. E. (National Institute for Cultural Relations with Foreign Countries) has organized courses for medical graduates from abroad, who may wish to keep abreast of the latest developments of Italian medical science. (1) Such courses are scheduled for the month of June, taking place in Rome, from 5th June to 17th June, after which they adjourn to Bologna, Pavia and Milan until the 22nd.

The present programme will deal with those particular subjects in which Italian medicine has reached an outstanding position either on scientific or on practical lines; and will present:

(a) Six short courses of 6 to 8 hours each on: surgery, hæmatology, malariaology, orthopædies, phthisiology and 'corporative' social medicine.

(b) Lectures on scientific subjects by Professor Raffaele Bastianelli, Sir Aldo Castellani, Professor Cesare Frugoni, Rev. Father Agostino Gemelli, Professor Rodolfo Margaria, Professor Nicola Pende, Professor Luigi Preti and Professor Pietro Rondoni.

(c) Lectures on public health organization and preventive medicine: O. N. M. I. activities (National Organization for Mother and Child Welfare); health services of the G. I. L. (Fascist Youth Organization); land reclamation ('bonifica integrale'), etc.;

(d) Visits to scientific institutes; public health achievements; field-trips to the Agro Romano and Pontino, and so forth.

Lectures will be held in Italian, but summarized translations as well as an interpreter will be available on application.

The tuition fee amounts to 300 lire, inclusive of trips to the reclaimed areas.

All the facilities granted to the students of the I. R. C. E. language and culture courses will be provided for the medical courses as well.

For detailed schedules please apply to the I. R. C. E. Via Lazzaro Spallanzani 1A, ROME.

Applications for the courses must be filed before 1st May, 1939.

Rome, 30th January, 1939.

THE BALKAN MEDICAL UNION

THE Balkan Medical Union is essentially a scientific organization. But it also represents an ideal. Its aim is to bring together the intellectuals of different countries so that they may know each other and come to a mutual respect and understanding, and in this way form a compact block capable of opposing the misunderstanding that engender hate and disastrous struggles between nations.

This 'Union' was formed in 1931 by a handful of men sincerely convinced that this humanitarian aim

could and should be easily attained. Their conviction is based on the belief that this object is in the line of human evolution and that in helping this evolution the forward march can be hastened.

For intellectuals who have known how to see and grasp that which is the essence of humanity what more beautiful ideal can be thought of than to work with all their faculties, all their energy to establish an understanding between men.

It is through the 'Medical Weeks' that our Balkan Union tends to realize these aspirations.

Athens, Belgrad, Bucarest, and Istanbul, each in turn have seen more and more numerous and enthusiastic groups come together, all permeated by the same desire of comprehension and friendship. We doctors know that a very small quantity of vaccine can protect millions of men from the danger of contagious diseases. So the good seed scattered by the Balkan Medical Union is a real remedy against the evils set loose by human passion.

Prof. Dr. ^A Akil Moukhtar Özden.

UNQUALIFIED PRACTITIONER SENTENCED

THE Subdivisional Magistrate, Khanewal, convicted Mr. Abdul Rahman under section 6 of the Indian Medical Degrees Act, 1916, for using the letters 'L.M.P. and L.C.P.S.' after his name without any lawful authority.

THE WILLIAM GIBSON RESEARCH SCHOLARSHIP FOR MEDICAL WOMEN

MISS MAUD MARGARET GIBSON has placed in the hands of the Royal Society of Medicine a sum of money sufficient to provide a Scholarship of the yearly value of £292, in memory of her father, the late Mr. William Gibson of Melbourne, Australia. The Scholarship is awarded from time to time by the Society to qualified medical women who are subjects of the British Empire; and is tenable for a period of two years, but may in special circumstances be extended to a third year. The next award will be made in June 1939.

In choosing a scholar, the Society will be guided in its choice 'either by research work already done by her, or by research work which she contemplates. The scholar shall be free to travel at her own will for the purpose of the research she has undertaken'.

There is no competitive examination, nor need a thesis or other work for publication or otherwise be submitted. The Society has power at any time to terminate the grant if it has reason to be dissatisfied with the work or conduct of the scholar.

Applications should be accompanied by a statement of professional training, degrees or diplomas, and of appointments, together with a schedule of the proposed research. Applications must be accompanied by testimonials, one as to academical or professional status, and one as to general character. Envelopes containing applications, etc., should be marked on top left-hand corner 'William Gibson Research Scholarship' and should be addressed to Mr. G. R. Edwards, Secretary, Royal Society of Medicine, 1, Wimpole Street, London, W.1., and be received not later than Thursday, 1st June, 1939.

THE FACULTY OF RADIOLOGISTS

THE British Association of Radiologists and the Society of Radiotherapists of Great Britain and Ireland have decided to amalgamate under the title of 'The Faculty of Radiologists'. The work of the Faculty will be carried on at the old office of the British Association of Radiologists at 32, Welbeck Street, London, W.1.

BELGIAN SOCIETY FOR TROPICAL MEDICINE, ANTWERP

THIS Society has recently conferred the honour of 'Membre-correspondant' on Brevet-Colonel R. N. Chopra, C.I.E., K.H.P., M.D., Sc.D. (Cantab.), F.R.C.P. (Lond.), I.M.S., Director of the School of Tropical Medicine, Calcutta.

Current Topics

Short Notes on the Failures of Uleron

By J. HARTUNG

(Abstracted from the *Münchener med. Woch.*, Vol. 85, No. 49, 1938, p. 1899)

THE author observed of undesirable effects in his first series (700 cases), one case of neuritis, one of gastritis, one of icterus and nine exanthemata, a figure which was reduced to only three cases of exanthemata due to Uleron when the doses were subsequently modified. The gradual disappearance of by-effects in clinical experience runs parallel with the decrease of Uleron-resistant cases. Hartung showed that with the introduction of short concentrated courses the percentage of failures was markedly less than with high protracted doses. However, allowing a proportion of resistant cases to any form of treatment there still evidently remained a number of cases in which Uleron did not produce a cure. These failures were apparently due to a wrong technique. Various explanations have been brought forward. In some patients endoscopic examinations of the urethra proved helpful to explain the cause of Uleron resistance. These cases usually showed small purulent glands in the urethra which were absent in those patients who readily responded to Uleron. It seems reasonable that in these cases the higher and protracted dosage would not improve the results but may increase the risk of by-effects. The removal of these purulent glands by cauterization made the Uleron resistance disappear and the patients were eventually cured by the same drug.

Opinions concur that although gonococci disappear from the urethra after the first four days' course ('stoss') of Uleron they may persist in the para-urethral ducts, and no increase or repetition of dose will change this state of affairs. Cauterization of the para-urethral ducts and inflamed Littre glands seems to be the best procedure to achieve ultimate cure.

Hartung, not satisfied with the rather crude empirical finding that Uleron is evidently more successful in the sub-acute and chronic cases than in acute infections, has subjected all his cases to the gonococci-complement-fixation test (CFT) and found that the results were particularly good when the CFT was positive, in other words when the organism had already acquired a certain amount of immunity. In uncomplicated gonorrhoea the CFT becomes slightly positive after a fortnight and increasingly so later on. Comparative results showed that the response to Uleron was in general better in direct proportion to a positive CFT. Comparing the number of patients treated, it was found that in cases with slightly positive CFT the first Uleron 'stoss' gave about 83 per cent cures, whereas with a negative CFT the cures amounted to only 36 per cent. Drawing his conclusions from these figures Hartung decided to produce a positive CFT as early as possible to make the patients amenable to Uleron treatment and he did so by stimulating the immunization process by the use of specific vaccines. A gonococcal vaccine was injected in very small initial doses of 20 mill. germs on the first day, 40 mill. on the third, 80 mill. on the fifth, 160 mill. on the seventh and 200 mill. on the ninth day which eventually resulted in a positive CFT. Thereafter allowing a few days to lapse, the Uleron 'stoss' was given, the cure rate being 80 per cent.

When applying this form of treatment in all cases, it means giving up the rather spectacular abortive effect which was sometimes achieved with a single Uleron 'stoss' of four days in cases of acute gonorrhoea to the extent of about 25 per cent of all cases. Theoretically it seemed reasonable to modify the whole treatment in the way that one Uleron 'stoss' was given first to get the benefit of the 25 per cent immediate cures and to treat the remaining 75 per cent according to the above vaccine-Uleron method. Hartung when

putting this theory to the test however found that the remaining 75 per cent who had received already an Uleron treatment without any vaccine proved to be rather refractory and in further treatment the cure was protracted in an unusual way. The author concluded that the advantage of the 25 per cent immediate success should better be foregone in favour of the less striking combined vaccine-Uleron treatment with an average cure-rate of 80 per cent although it meant the extension of the course which otherwise would last four days to an average of a fortnight up to three weeks.

It seems, in view of the above, that much more research and exact clinical observations are necessary to arrive at a definite appreciation of the value of Uleron and other sulphonamide preparations in the treatment of gonorrhoea. Already now there is sufficient evidence to show that Uleron is a definite advance in the treatment of this disease which apart from its value *per se* has stimulated valuable investigations into the much disputed immuno-biological processes in gonococcal infections.

Hiccup

(From the *Lancet*, Vol. II, 19th November, 1938, p. 1212)

Hiccup is one of those complaints which, like mumps and sea-sickness, is apt to be considered a joke by everyone except the sufferer himself. Actually, except in its most transitory forms, it is always distressing, and, in its post-operative and epidemic types in old people, may prove fatal. The great majority of cases owe their origin to acute or chronic dilatation of the stomach, with or without intestinal meteorism, but the less common causes are legion. Dr. A. H. Douthwaite divides them into three classes. Of the first, the central causes, the most important are uræmia—especially after prostate operations, when reflex irritation from the operation site or from meteorism is a contributory cause—and hysteria, also usually post-operative. This group also includes the intractable hiccup met with in epidemics of encephalitis lethargica, and the toxic forms seen in pneumonia and typhoid. In the second class the condition is secondary to irritation of the phrenic nerve, very rarely from lesions in the neck, sometimes from mediastinal pleurisy, tumour or pericarditis, or from a diaphragmatic hernia, sub-diaphragmatic abscess or secondary deposits in the liver. The third class, the reflex, is the most common. This may arise in the stomach, as in children who bolt their food and in sufferers from gastritis and the indigestion of over-smoking; in the intestines, from distension or the irritation of thread-worms; and possibly in the prostate and liver.

Many of the forms of treatment are empirical and have been devised by sufferers themselves—for example, the induction of sneezing (as Bason observes) or vomiting, drinking from the wrong side of a tumbler, holding the breath, or applying a tight binder to the epigastrium. 'The hicket', writes a sixteenth-century doctor, 'is cured with sudden feare or strange news'; another maintains that 'it is good to caste colde water in the face of him that hathe the hicket'. Turning to more drastic remedies, the phrenic nerve may be attacked directly by firm pressure above the clavicles or by the injection of procaine at the same site. One of the most effective methods is the inhalation of 5 to 7 per cent of carbon dioxide in oxygen, or, more simply, breathing in and out of a paper bag. Morphia is justifiable for persistent cases, and may be life-saving in the epidemic variety. Where there is dilatation of the stomach lavage usually gives relief. Meteorism may be relieved by passing a flatus tube or giving 1 to 5 c.cm. of prostigmin or 0.5 to 1 c.cm. of pituitary extract. In post-operative cases it is important to reduce the fluid intake which has often been pushed to excess. In the milder forms associated with vague indigestion and flatulence carminatives such as sal volatile may help. Drugs are on the whole disappointing, though many are recommended.

Finally, in hysterical hiccup, careful explanation, combined with some impressive procedure, or the mere suggestion of stomach lavage, may work wonders, but hypnosis may be necessary in a few obstinate cases. Fortunately most patients will recover spontaneously before many of the formidable list of therapeutic measures have been tried.

The Treatment of Vaginal Discharge in General Practice

By W. F. T. HAULTAIN, O.B.E., M.C., F.R.C.S. (Edin.),
M.R.C.P. (Edin.), F.C.O.G.

(From the *Medical Press and Circular*, Vol. CXC VII,
23rd November, 1938, p. 468)

ONE of the commonest gynaecological complaints which a general practitioner is called upon to treat is vaginal discharge, so-called leucorrhœa, though this nomenclature is not strictly accurate for the number of various types of discharge which may be found. Up to a few years ago the general treatment of leucorrhœa consisted of vaginal douches with various kinds of antiseptics, and, whilst they gave temporary benefit owing to their cleansing effect, the discharge was seldom cured unless douching was persisted in almost daily. No antiseptic has yet been found which, by means of constant douching, would destroy the offending organisms and not have a similar destructive effect on the vaginal walls, thus intensifying the already present discharge: in some cases the cessation of antiseptic douching and a douche of saline or boiled water would cure a discharge which had been present for years due to constant irritation of the vaginal walls. During the last few years a large amount of work has been done not only on the ætiology and pathology of vaginal discharges, but also on the physiology of the normal vaginal secretion. By such investigations the treatment of pathological vaginal discharge has made great progress, the great aim being, after destroying any pathological invasion, to get the condition of the vaginal mucosa back to normal again and, if this can be attained, the discharge is permanently cured unless reinfection occurs.

Vaginal discharge may occur at three different periods of a female's life: (a) before puberty; these cases are very rare and are either due to illicit intercourse or, more commonly, to uncleanliness and dirt; (b) during the child-bearing period; and under this heading one can group (1) in married women, (2) in virgins; and (c) after the menopause—so-called senile vaginitis. It is, however, cases under group (b), and especially of married women, that form the great bulk of the cases who complain to their medical attendants, and it is these which will be chiefly considered. Cases of true gonorrhœal discharge will not be touched upon, in the first place because it is without the scope of this paper and, in the second, because such discharges definitely proved to be due to the gonococcus are apparently very rare indeed and many that used to be thought to be due to such a cause are really infections by the *Trichomonas vaginalis*, which has now been proved to be such a common offending organism.

When a patient attends complaining of a vaginal discharge, the first thing to note is the character of the discharge, i.e., its colour, odour, viscosity, etc.; secondly, the state of the vaginal mucosa itself—is it normal to look at, or is it definitely inflamed, or are there reddened discrete patches studded over the mucosa and cervix? Is there marked irritation of the vulva and the surrounding structures caused by the discharge? Thirdly, is there an erosion or eversion of the cervix present, or, possibly, a small mucous polypus protruding? And lastly, is there any urethral discharge as well? The nature of the discharge is, in the first instance, all important as a tenacious, viscid discharge is always chiefly cervical in origin, whether or not any erosion is found, and thus local treatment to the vagina is absolutely useless, and the only way to treat such a condition is to treat the endocervicitis which is present,

and this can only be done effectively by cauterization with the electric cautery, though some people prefer the diathermy current. An offensive discharge very often denotes that constipation is an accompanying feature, and if it be treated then the odour disappears and frequently the discharge as well. An acute vaginitis, vulvitis and urethritis may denote gonorrhœa, but a subacute vaginitis associated with irritation around the vulva is frequently due to trichomonal infection, as is also the case in the vagina which is studded by discrete red patches. A smear should be taken from the vagina in all doubtful cases, a sterile smear being taken by means of a platinum loop if gonorrhœa is suspected, but for a trichomonal infection a smear of the discharge collected on the examining finger, smeared on a slide and stained by Leishman's stain for 20 minutes and then washed off with water, will show up trichomonas if they are present: the old hanging drop method, which was difficult to do and to obtain positive results, is not necessary now as staining, as above described, seems to be more efficacious and is certainly very much easier to do.

If there is no vaginal irritation and if the discharge is white and not purulent, it is important to know if the discharge is due to a local vaginal condition or some general cause, such as debility, anæmia, avitaminosis, etc. This can usually be done by testing the pH of the discharge, which can now be easily carried out with the universal indicator of B.D.H., an equal quantity of the discharge and the colouring agent being smeared on a slide and the colour of the resultant mixture compared with the colour table on the bottle. The normal vaginal discharge is acid, having been made so by the lactic acid formed by the action of the vaginal bacilli (Döderlein's) on the glycogen, which is produced by the action of oestrin on the vaginal mucosa. The normal pH is in the region of 4.4, and if the discharge is due to general causes the pH. is not greater than 4.4 to 4.6; over that amount, however, the discharge is definitely due to pathological invasion and it would seem that trichomonal infection gives the highest pH 5.8 to 6.8. If the discharge is due to general causes, then general treatment, usually of some duration, is solely required and as the patient's condition improves so does the discharge.

For the consideration of treatment, pathological vaginal discharges can be divided into three main classes, according to their severity. In the mild cases the application of lactic acid to the vagina is often sufficient and the treatment is easily carried out. This can be done by daily douching with lactic acid (1-500), or better with sour milk diluted half and half with water, as this supplies the lactic acid bacilli as well as the acid itself. An easier method is to prescribe a pessary containing lactic acid, such as spuman pessaries with lactic acid: two of these are inserted into the vagina on alternate nights after a boiled water douche on three occasions, and this is followed by a further similar course, using one pessary instead of two; a last douche is given 48 hours after the insertion of the last pessary so as to get rid of any debris. This treatment has been found to be efficient in the cases of white discharge causing discomfort but which is not very profuse or discoloured.

In the more moderate cases the dry method of treatment following antiseptic swabbing is usually efficacious and can be easily carried out in the consulting room or the patient's home. The treatment is carried out as follows: a bivalve or single speculum is inserted and the vagina cleansed by swabbing with soda bicarbonate solution; it is then dried and painted all over either with picric acid, 2 per cent, or dettol (pure); the vagina is now very thoroughly dried and then insufflated with an inert powder, such as dermatol powder, the chief constituent being bismuth subgallate. This is done daily for several days, then on alternate days, every third day, and lastly, once a week, the whole treatment lasting about one month, but many cases are cured before this time.

The severe discharges, especially those associated with vaginal redness and vulval irritations which are

usually purulent and frothy, are commonly due to *Trichomonas vaginalis*, and this organism has proved to be very resistant to the usual forms of treatment. They, however, seem to be destroyed by arsenical or silver preparations, but, unfortunately, though apparently cured, recurrences are frequent, especially following a menstrual period or intercourse. The most simple way of treating such a condition is by means of arsenical tablets or pessaries, which can be inserted by the patient herself; many of these are on the market and have proved to be efficacious in a large number of cases, but they must be given in a sufficient dosage to cure the condition. Though this is usually quite a safe form of treatment, I have seen one or two cases of mild arsenical poisoning result from their use in cases where the vagina seemed to be especially absorptive to arsenic, and therefore cases so treated must be carefully supervised so as to detect such a condition arising at its very beginning. Some cases, however, need a more intensive treatment, and for the last two years two methods have been tried out in the gynaecological clinic under my charge.

The first method consists, in the first instance, of insufflation of the vagina, after it has been dried, with a silver picrate powder, the preparation used being Pieragol and the insufflator used being that of Wyeth Bros., which I have found to be very satisfactory, especially as it is used without a speculum and can be inserted into the narrowest introitus without causing pain or discomfort. After the insufflation has been done, Pieragol pessaries are inserted, one daily for a week, after which a second insufflation is carried out followed by a further course of a week's treatment with pessaries. Usually this is sufficient to clear up the discharge, temporarily at any rate, but in some cases a further course is required after the next menstrual period is over.

The other method is by means of Stovarsol; the vagina is insufflated with Stovarsol powder, and this is done each day of the menstrual period, the vagina being dried before the application of the powder. During the inter-menstruum, Stovarsol vaginal compound tablets, one daily, are inserted into the vagina and a further insufflation is given at the next period. The reason why this treatment has been carried out at the menstruation is that it has been found by Swift, in Australia, that the trichomonas seem to be actively growing then, being much smaller in size and seeming to be more active if a film is examined from the discharge at that time.

Both these treatments have given satisfactory results and I am not yet able to say which is most satisfactory. If one fails the other practically always succeeds, and if a patient is found to have an idiosyncrasy to arsenic, then the Pieragol is an excellent standby. On the other hand, I have seen two cases of picric poisoning or rash in women who have an idiosyncrasy to picric acid. Lately, I have followed one insufflation and course of pessaries by further pessaries of lactose, glucose and boric acid aaa gr. v , to try to restore the normal functions of the vaginal mucosa, and, though it is too early yet to say definitely, the results are very promising.

With regard to vaginal discharges, it is possible that they may also be due to trichomonas, or, as is more frequently the cause, due to general conditions. Sometimes a sticky white discharge is present which is very persistent, and it is often found that this is due to a congenital cervical erosion, the cauterization of which will cause immediate cessation of the discharge. Another cause of ... is a hymen, which almost obliterates the introitus and allows secretion to accumulate and cause increased irritation to the vaginal mucosa. Such cases have been cured by a perineotomy, allowing free drainage.

In cases of senile vaginitis, again the trichomonas may be the causal factor, but most frequently the discharge and vaginal inflammation are due to a decrease of oestrii secretion and the administration of large doses of oestrii, say 50,000 I. B. U., twice weekly will, in practically every case, cause the vagina to become normal again and the discharge to cease. Such cases,

however, should always be curetted in the first instance to exclude a carcinoma of the body of the uterus; during the last year I have diagnosed three such cases, where the only symptom was a purulent vaginal discharge with no bleeding. In a small number of cases of senile vaginitis a small mucous cervical polyp is found, which is the causative factor, but there is still the possibility of the presence of a carcinoma of the body of the uterus in such cases as well.

From those remarks it will be seen that the treatment of the purely vaginal discharges can be carried out efficiently and well by the general practitioner, either in his own surgery or in the patient's home, and it is only the very few persistent cases which require hospital treatment.

The Ætiology of Nausea and Vomiting of Pregnancy

By J. WILLIAM FINCH, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. CXI, 8th October, 1938, p. 1368)

THIS paper is a preliminary report on work being done to prove that nausea and vomiting accompanying pregnancy are due to an allergic reaction of the patient to the secretion of her own corpus luteum graviditatis.

This symptom complex is one which has been confronting the medical profession for centuries, the first record being made by Soranus of Ephesus in the year A.D. 20.

Various authors state that in from one-half to two-thirds of all obstetric cases there is nausea and vomiting to some degree during the first few months of pregnancy. So numerous have been the theories as to the ætiology of this symptom complex that in this brief report no effort to discuss them will be made. The treatments recommended have been as variable and numerous as the theories of ætiology.

The patient exhibiting nausea and vomiting may have these symptoms as a first indication of an existing pregnancy. The symptoms almost invariably begin between the third and the sixth week of pregnancy and gradually subside some time near the fourth month of pregnancy. The symptoms may vary in severity from the mild case, so frequently seen, in which there is morning sickness with or without vomiting, to the moderate case in which there is nausea all day long, frequently vomiting, and extreme discomfort for weeks. Or the case may advance to the true hyperemesis gravidarum with a truly serious prognosis.

Hirst was the first to connect the nausea and vomiting of pregnancy with the functioning of the corpus luteum. He states that every woman during her menstrual life is constantly absorbing corpus luteum substance but that with the onset of pregnancy this absorption ceases. On this theory he administered corpus luteum extract to a number of patients with surprisingly good results in alleviating or stopping their symptoms.

The corpus luteum, with impregnation, continues to develop instead of taking on the customary retrogressive changes during and after menstruation. The corpus luteum of pregnancy develops to a size much larger than the false corpus luteum; the colloid is more abundant in the organ and the granulosa cells are larger than before pregnancy. This enlargement takes place at the same time that symptoms of nausea and vomiting develop and the patient begins to be relieved of her symptoms about the fourth month, at which time retrogressive changes are taking place in the corpus luteum.

Considering that the development of the nausea and vomiting and the development of the corpus luteum of pregnancy occur at the same time and that the time of retrogressive changes in the gland, I decided to conduct a series of tests on the theory that the nauseated and vomiting patient is allergic to her own hormone, develops her symptoms as a result of her sensitivity and returns to normal after the gland ceases to feed its secretion into her body in such quantity.

On the same theory it can be assumed that Hirst was able to relieve his patients not by giving them a secretion in which they were deficient, as he assumed, but by desensitizing them and relieving them of their allergic reaction to the hormone.

Patients were tested by cleansing the skin with alcohol and injecting intradermally from 0.02 to 0.03 c.c. of progestin in sterile cottonseed oil and recording reactions fifteen and thirty minutes later. Reactions were calibrated from negative to 4 plus, according to the size of the weal and the surrounding erythema produced just as in intradermal injections of any food, drug or pollen extract or animal dander to determine a patient's degree of sensitivity. A control injection was made with sterile cottonseed oil in the same arm. The majority of the tests were made on the volar aspect of the forearm. A few patients were tested with a solution of progestin in sterile almond oil but the cutaneous reactions to the almond oil were so much greater than those to the cottonseed oil that the latter product was used in the remainder of the cases. One interesting notation has been that several of the pregnant patients who were nauseated and gave 3 or 4 plus reactions to the progestin intradermally have complained as late as five or six weeks after the intradermal injection that when they become nauseated severely the area of injection again becomes irritated and forms a weal with a surrounding erythema and an itching sensation. I know of no way to explain this other than that the solution injected, being an oily one, is absorbed very slowly, and part of it remains in the skin for a protracted time. An extremely high percentage of the patients with nausea and vomiting of pregnancy gave a family history of allergy.

COMMENT

This is only a preliminary report, but I believe that the uniformity of the results of the intradermal tests, the good results on the patients treated along the lines of allergic desensitization and the huge number of women afflicted with these symptoms at all times merits an investigation on a large scale. It would also be of interest to test with intradermal progestin a series of young girls before puberty.

I believe that patients presenting nausea and vomiting either have inherited directly a sensitivity to progestin or, more probably, have inherited the allergic tendency and become sensitive to their own corpus luteum secretion during their menstrual cycles or from the corpus luteum of a previous pregnancy.

If further investigation confirms these observations, one might well assume that a patient desiring pregnancy could be tested for sensitivity to progestin and, if found sensitive, could be desensitized before impregnation or before the corpus luteum of pregnancy reaches the stage of enlargement necessary to produce the symptoms of nausea and vomiting. This treatment would consist of graduated doses of progestin injected at closely spaced intervals until the patient is desensitized and the symptoms either do not develop or are relieved if they have already developed. It would be of further benefit, I believe, if a solvent other than oil could be used for the progestin, since the various oils now in use are more or less irritating to the skin of patients when injected intradermally and are slowly absorbed. A solution less irritating and more quickly absorbed would probably also enhance the treatment of nausea and vomiting along these lines by allowing intradermal injections to be given concurrently with the subcutaneous injections for desensitization.

SUMMARY

1. Nausea and vomiting of pregnancy develop at the same time at which the corpus luteum of pregnancy reaches an appreciable size. The symptoms disappear at about the time the gland is known to begin retrogressive changes.

2. In a series of patients with nausea and vomiting of pregnancy in varying degrees when injected intradermally with from 0.02 to 0.03 c.c. of progestin in oil a cutaneous reaction developed directly proportional to the severity of the symptoms.

3. A control series of patients who were not nauseated and in the pregnant state gave negative cutaneous reactions when tested in the same manner.

4. Patients treated with subcutaneous corpus luteum extract and progestin along the lines of allergic desensitization were gradually relieved of their symptoms.

5. A high percentage of the patients with nausea and vomiting of pregnancy either had other diseases of allergy or gave a family history of allergy.

CONCLUSIONS

1. The nausea and vomiting accompanying pregnancy is due to an allergic sensitivity of the patient to the secretion of her own corpus luteum of pregnancy.

2. Desensitization may be accomplished by injection of graduated doses of progestin, thus alleviating or stopping the patient's symptoms.

3. Intradermal testing may determine, even before pregnancy, whether a patient will or will not be nauseated when pregnant by determining whether or not she is sensitive to progestin.

A New Chemical Contraceptive

By JOHN R. BAKER, D.Sc.

R. M. RANSON

and

J. TYNEN

(Abstracted from the *Lancet*, Vol. II,
15th October, 1938, p. 882)

AFTER introducing hexylresorcinol and other substances into practical use, we spent much time exploring the possibility of using other phenol derivatives, especially the parahydroxybenzenes. During the course of our work at this time we added a very small amount of a well-known organic mercury compound to one of our gelatin gels in order to inhibit bacterial growth and were surprised to find a marked increase in spermicidal power. This particular substance presents certain disadvantages, but as the result of investigating other organic mercury compounds we discovered phenyl mercuric acetate to be the most spermicidal substance in weakly acid solution of any that we have ever tested. Its killing concentration is 1/1024 per cent in acid and 1/256 per cent in alkaline media. Phenyl mercuric nitrate has a killing concentration of 1/1024 per cent in both acid and alkaline media. It must be stressed that these are not simply the most spermicidal harmless substances, but absolutely the most spermicidal substances known, the acetate heading the list in acid and the nitrate in alkaline solution. A killing concentration of 1/1024 per cent makes these substances no less than 512 times as spermicidal as quinine bisulphate and chinolol, which have been used so much in chemical contraception.

PREPARATION AND TESTS

Since a solid product was desirable, for convenience of handling, and since the spermicide must be in solution in water, we have worked with gelatin gels. For the spermicide we have preferred phenyl mercuric acetate to the nitrate. Although the latter is the more spermicidal in alkaline media, it possesses disadvantages which outweigh this advantage and would outweigh it even if the mixed semen and vaginal fluid were alkaline. Actually there are reasons for supposing that the semen may usually be changed somewhat to the acid side of neutrality by the lactic acid of the vaginal fluid. We have succeeded in making a permanently stable solution of the acetate in the water of our gels by buffering at about the pH of human semen. A powerful dispersive agent in emulsion is added to give rapid mixture with semen, and little glycerol to make the whole product approximately isotonic with the body fluids. It has been a principle with us for some years that a chemical contraceptive should not be widely different in osmotic pressure from blood. Many commercial preparations are extremely hypertonic, and

water drawn into the vagina may not only dilute the spermicide but also give undue lubrication. An account of the method of preparation of our product will be published elsewhere.

The final product is designated as P.383. The gels are cast as discs, each weighing 2.5 grammes. They are lightly dusted with starch grains to prevent their sticking to one another or to the glass tube in which they are packed. The gels are unsuitable, however, for use in hot climates without special cool storage, as they melt when warmed to near the temperature of the body. (The melting-point being close to that of dairy butter, the conditions under which that can be stored may be taken as a guide for the storage of gels, which however must not be frozen solid.)

The total spermicidal powers of these gels have been compared with those of the best-known contraceptive suppositories on the market. The tests of spermicidal power of suppositories are carried out in the same way as those of pure substances, except that the concentrations are differently expressed. Tests are made at the 'standard' or S concentration of one suppository to 6 c.cm. of fluid (which is thought to be about the usual amount of fluid in the vagina after ejaculation), and at half, one-quarter, etc., of this concentration (S/2, S/4, etc.). It may be mentioned that every detail of these tests was settled before we had discovered the high spermicidal power of phenyl mercuric acetate.

The gels designated as P.383 have, according to these tests, a killing concentration of S/8. Of the ten well-known contraceptive suppositories which we have tested, three have a killing concentration of S/2 and three of S, while four fail to kill at S.

In acid media P.383 is even more spermicidal, with a killing concentration of S/16. If it were desired the spermicidal powers of these gels could be still further increased by adding more phenyl mercuric acetate, but it has been thought unnecessary to exceed S/8 and S/16 in alkaline and acid media respectively.

Since the rate of escape of the spermicide from the vehicle is as important as the total spermicidal power, a special diffusion test is carried out, in which mechanical mixing of the product with the semen is avoided. Observations are made at 2, 5, 15, 30 minutes, etc., up to 3 hours.

Four other makes of suppository on the market were compared with P.383 in the diffusion test. P.383 has the most rapid rate of diffusion: marked diminution of activity was observed in two minutes and all the sperms were generally dead (not merely immobilized) in five. Two of the marketed products which we tested diffused so slowly that scarcely any effect was observed on the movement of the sperms after an interval of half an hour and some activity was still evident after three hours. These were the two products which showed the best results in the test of total spermicidal power of all the ten which we compared with P.383. With the third proprietary product which kills at S/2, some sperms were still alive at 15 minutes in the diffusion test. It would be waste of time to apply the latter test to those suppositories which failed to kill even at S in the test of total spermicidal power, in which all the killing power extractable from the product is made use of for action on sperms, without any reliance on the diffusive power of the product.

Repeated trials showed P.383 to be harmless to the vagina and cervix of the bitch. As usual, in order to make the test stringent, we placed half the human dose in the vagina daily (except on Sundays) for a fortnight, and the bitch was then killed and the vagina and cervix sectioned and examined microscopically by Dr. Carleton. The gels were then distributed to clinical workers for practical test under medical supervision. Their reports on the æsthetic qualities of the gels are favourable.

CLINICAL TRIALS

One of us has pointed out the unreliability of reports on clinical tests of the effectiveness of contraceptives. One can never be certain that the product is used in the right way—e.g., before and not

after coition—nor even that it is used at all on every occasion. It is not certain that any chemical contraceptive, however spermicidal, could ensure safety to a multiparous woman with a patulous or split cervix, in the absence of an occlusive pessary.

It is important to stress the fact that the great majority of the women who tested the gels had already borne children, many of them being very fertile and having had repeated pregnancies (up to a maximum of 12) before starting to use P.383. The woman who became pregnant is multiparous and has a split cervix.

In addition to the women there are many who have used the gels alone or in various combinations, but about whom there are no exact data except that they have not reported themselves pregnant. One doctor alone has distributed over 2,500 gels in this way, over a period of a year, without a pregnancy being reported to him. There are also 15 women whose husbands have used sheaths while they have used the gels. One woman in this category has become pregnant, but the clinical worker doubts whether in this particular case the gels were actually used.

The standards which we have tried to realize in P.383 are the following:—

1. It should be inexpensive.
2. It should be solid, and therefore require no special appliance for insertion into the vagina.
3. It should be small.
4. It should be unaffected by the ordinary range of climate.
5. It should neither leave any trace on the skin when handled, nor stain fabrics.
6. It should contain no volatile nor odorous substance.
7. It should be non-irritant to the vagina, cervix, and penis.
8. It should be without pharmacological effect if absorbed into the blood stream.
9. It should contain a substance reducing surface tension, to ensure the smallest crevices of folds of the vagina being reached.
10. It should kill sperms at S/8 or lower concentration in the alkaline and acid tests for suppositories, and the spermicide should diffuse rapidly out of the vehicle into semen.

Dickinson and Bryant use a closely similar list, but require also that it must not be easily displaceable.

It may be claimed that P.383 satisfy all these requirements, provided that the words 'ordinary range of climate' refer to Great Britain and other cool parts of the world. With regard to the requirement that the product should not be easily displaceable, it may be stated that P.383 are fluid when melted at body temperature, but we have found that sticky vehicles prevent that rapid diffusion of the spermicide which is so essential for success.

Reviews

THE BRITISH ENCYCLOPÆDIA OF MEDICAL PRACTICE—INCLUDING MEDICINE, SURGERY, OBSTETRICS, GYNÆCOLOGY AND OTHER SPECIAL SUBJECTS.—Under the General Editorship of Sir H. Rolleston, Bt., G.C.V.O., K.C.B., M.D., D.Sc., D.C.L., LL.D. Volume IX. Butterworth and Company, Limited, London. Pp. xxix plus 752 plus 53. Illustrated. (To be completed in 12 volumes. Sold in complete sets only. Cash price, Rs. 25 per volume.) Also available on the instalment system at Rs. 26-8 per volume. Payable Rs. 10 monthly. Only available from Messrs. Butterworth and Company (India), Limited, Calcutta

THIS volume deals with subjects from mumps to pneumothorax, and includes chapters on a number of matters of considerable practical importance to practitioners in any country, namely, on pneumonia (lobar)

by Dr. R. A. Young of the Middlesex and Brompton Hospitals, on peptic ulcer by Thomas Hunt of St. Mary's Hospital, and nephritis and nephrosis by Dr. Izod Bennett.

The chapter on lobar pneumonia is orthodox and up to date; no details are given of the treatment by MB. 693, but Whitby's experimental work and Evans and Gaisford's successful clinical trials (this latter reference must have been a last-minute addition, as the paper was only published last July and this volume was received in India in November) are included. Neither digitalis nor alcohol are recommended for routine administration, but the value of oxygen is stressed: either the oxygen tent or the nasal catheter is recommended, and the rate of flow of oxygen in the case of the latter is given as 4 to 16 litres per minute.

In the chapter on peptic ulcer there is a well-balanced discussion on the different methods of treatment. The criticisms on the histidine treatment of this condition are moderate and certainly fair. Medical treatment, with of course a dietetic regime, is given preference; the indications for surgical treatment are the usual ones, but the writer considers that medical treatment should be given more than one chance unless definitely contra-indicated.

Another important chapter from the practitioner's point of view is that on peritonitis. This is contributed by three writers; Dr. Zachary Cope deals with acute peritonitis, Dr. C. E. Lakin with chronic peritonitis, and Dr. C. E. Kellett with tuberculous peritonitis in children.

There are two chapters on medico-legal subjects—the first on that interesting subject, disputed paternity and blood groups. The test is of course one for non-paternity, and it can never be more than that. It may prove that a man is wrongly accused, but never that the woman's accusation is correct. The other subject is professional negligence: this is a chapter that should be read by all practitioners; it is of course based on English law, but much of it is equally applicable in this country.

Of the chapters on tropical diseases the most important is that on plague by Dr. L. F. Hirst, who for many years worked in Colombo and made a special study of this subject. He gives a good account of plague from the historical, epidemiological, bacteriological, and clinical points of view. One is a little disappointed to find no reference to the histopathology of plague; this is a point about which most writers are very reticent. Sand-fly fever is described concisely but adequately by Air Commodore H. E. Whittingham, who did some useful original work on the breeding of sand-flies in Malta some years ago.

There is a good account of pellagra by Colonels J. Heatly-Spencer and A. G. Biggam. The recent work on nicotinic acid is included, but no special recommendations as to dosage are given, it is probably too early, even now, to be dogmatic on this subject; the important point is that small doses will often cure (100 mgm. daily) and that much larger doses are usually well tolerated. They stress the importance of giving vitamin B₃ for the associated neuritis.

All the articles in this volume are sound, practical and well presented.

A MANUAL OF REPARATIVE PLASTIC SURGERY.—By J. E. Sheehan, M.D., F.A.C.S. 1938. Oxford University Press, London. Humphrey Milford. Pp. xxi plus 311, with 314 illustrations and 18 full-page plates. Price, 30s. Obtainable from Oxford University Press, Bombay and Calcutta

Surgeons will welcome Professor Sheehan's second book, in which he presents an up-to-date review of the principles of plastic surgery together with a description of those operative procedures which he has found by experience to be most suitable.

An early chapter is devoted to forms and conditions of choice of skin grafts, in which prominence is given to the advantages of the free graft of intermediate thickness, and of the 'delayed' pedicle flap. Noteworthy, also, is the condemnation of the pinch graft which is dismissed as a 'surgical error' on account

of the clumsy result produced in both recipient and donor areas.

About half the book deals with the orbit, nose, and facio-maxillary regions with admirable clarity and a refreshing brevity not usually displayed by American writers. But in this section of the book instances can be given where an unimportant procedure could be omitted to give room to a more important one. Thus, the ophthalmologist will pass over the description on how to remove a pterygium, but will look in vain for hints on how to close a corneal fistula.

Or the rhinologist will find small interest in the description of septal resection, but will get no help in the problem of repair of a septal perforation.

The concluding chapter describes the treatment of miscellaneous conditions, and could well have been omitted or, better still, considerably expanded, as it upsets the balance of the whole book. For example, McIndoe's operation for hypospadias is the only genito-urinary plastic operation presented. Lastly, ophthalmic surgeons in this country will look on the section on corneal grafting and smile, for they have been doing better than this for some time past.

The illustrations and diagrams are numerous and excellent, and the script is clear, although there are a few annoying misprints.

W. McN. N.

THE STUDENT'S HANDBOOK OF SURGICAL OPERATIONS.—By Sir F. Treves, Bart., G.C.V.O., C.B., LL.D., F.R.C.S. Sixth Edition. Revised by C. P. G. Wakeley, D.Sc., F.R.C.S., F.R.S.E., F.A.C.S. (Hon.), F.R.A.C.S. 1939. Cassell and Company, Limited, London. Pp. xl plus 563, with 246 illustrations. Price, 12s.

The Student's Handbook of Surgical Operations by Sir Frederick Treves is already well known to the reviewer who found it a book of great value both when he was a student and later for reference when he was qualified.

It is eight years since the last edition was published and the present one has been brought thoroughly up to date. It includes amongst other additions, the newer operations on the brain and spinal cord and the various forms of osteotomy and arthrodesis. The number of illustrations have also been increased and are of great value in elucidating the text.

Mr. Wakeley is to be congratulated on the way he has revised this excellent, practical and concise book on operative surgery, which in my opinion is quite the best of its kind and should be in every student's possession.

F. W. A.

CANCER: WITH SPECIAL REFERENCE TO CANCER OF THE BREAST.—By R. J. Behan, M.D., Dr. Med. (Berlin), F.A.C.S. 1938. Henry Kimpton, London. Pp. xvi plus 844, with 168 illustrations. Price, 42s.

LACKING a single monograph embodying descriptions of the 'complex and varied changes which are associated with the different phases of cancer', Dr. Behan made a detailed study of the known facts and theories, resulting in the production of an excellent volume. This book was originally written as a treatise on mammary carcinoma, but, in order to make it more useful, its scope was increased to include a comprehensive knowledge of malignant disease in general. The breast shares with the uterus the distinction of being the commonest site of carcinoma, about 40 per cent of all carcinomata occurring in this gland. According to the United States census of 1935 mammary carcinoma caused 13,226 deaths which formed 9.2 per cent of the total mortality of that year. It seems fair to conclude that, at any given time, at least 65,000 women in the United States alone are suffering from mammary carcinoma. It has been estimated that in the civilized countries of the world 500,000 persons die of cancer each year. These figures reveal a telling picture. The author believes that in the study of the 'alterations in the biological activity of the individual cancer cell' lies the greatest chance of success for a more effective method of treatment.

There are 29 chapters in this book, the first five are devoted to the consideration of aetiology, pathology, and biochemistry. The next five chapters deal with symptomatology, diagnosis and biopsy and there are two chapters on the subject of metastasis. Prognosis is not a matter about which the present-day surgeon can feel at ease, for modern post-operative results do not show any appreciable improvement on the past. Treatment, therefore, has received very careful attention in this book. There is no question of operative treatment *versus* irradiation; in carcinoma of the breast there can be no disputing the fact that, in the absence of metastasis, surgery is best. The author lays down the dictum that irradiation is applicable in rapidly growing neoplasms in young subjects, in pregnant or debilitated women, and in widely disseminated inoperable new growths. The author is emphatic that a patient with mammary carcinoma should not be permitted to undergo pregnancy or even to continue menstruation, which is certain to augment the condition. He is of opinion that pregnancy should be interrupted as an urgent measure and menstruation eliminated by temporary castration by means of irradiation.

We have read this book with pleasure and profit, and we cannot recall any other book which gives so much information on the subject of mammary carcinoma. The illustrations are excellent but depressing. The many pictures of advanced carcinoma make one wonder whether it will ever be possible to achieve contact with patients in the earliest stages of the disease. For discouraging results, the surgeon is not alone responsible; the family physician holds the pivotal position. Carcinoma must be diagnosed early, and in early radical operation lies the surest chance of cure. We strongly recommend this book to the medical profession and, in particular, to the general practitioner in this country where the problem of malignant disease is of no less magnitude than in the West.

P. N. R.

PYE'S SURGICAL HANDICRAFT: A MANUAL OF SURGICAL MANIPULATIONS, MINOR SURGERY, AND OTHER MATTERS CONNECTED WITH THE WORK OF HOUSE SURGEONS AND OF SURGICAL DRESSERS.—Edited by H. Bailey, F.R.C.S. (Eng.). Eleventh Edition. 1939. John Wright and Sons Limited, Bristol. Pp. viii plus 512, with 362 illustrations. Price, 21s.

Pye's Surgical Handicraft edited by Hamilton Bailey is a manual of surgical manipulations, minor surgery, and other matters connected with the work of house surgeons and of surgical dressers.

The contributors, all well-known authorities, have revised a book which has already stood the test of over fifty years' publication and in so doing have produced a handbook which fully fulfils the purpose for which it was intended—namely, a practical guide for house surgeons and surgical dressers.

It is well illustrated, easy to read and full of wisdom; and I do not hesitate to recommend it to the busy practical man.

F. W. A.

UROLOGY.—By D. N. Elsendrath, M.D., and H. C. Rojnck, M.D. Fourth Edition, entirely revised and reset. 1938. J. B. Lippincott Company, Philadelphia and London. Pp. xxi plus 1061. With 750 black and white illustrations and 12 in colour. Price, 42s. Obtainable from Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 28-0

It is hardly necessary to offer any introduction to this well-known work on urology. The reception given to previous editions is ample endorsement of the authors' efforts. Recent advances in both diagnostic and therapeutic methods have necessitated thorough revision of the text and inclusion of new material. Some of the newer features deserve special mention. A critical evaluation of excretion urography as a diagnostic method together with its advantages and limitations has been clearly set out. The chapters on

venereal diseases have been brought up to date, but paradenitis (lymphopathia venereum), however, is only briefly described. Recent studies on male sex hormones and gonadotropic principles found in urine have been included under appropriate sections.

The growing importance of cystometry in the diagnosis of neurological disturbances of the urinary bladder has led the authors to include an interesting chapter on the subject. Some emphasis has been laid on the frequency of non-operative stricture of the distal portion of the ureter in the female sex. It is an observation worthy of careful attention. The importance of urology in women and children has been recognized and there are additional chapters on this subject. The section on operative technique will be much appreciated; it is replete with valuable practical hints. The method of trans-urethral resection in case of enlarged prostate has been clearly indicated.

This book may rightly be regarded as a standard work of reference and we have much pleasure in commending it to the notice of the medical profession in this country. We have no doubt that the present edition will meet with as cordial a welcome as that of its predecessors. The printing, get-up and illustrations are excellent; the appendix, and the references in the footnotes will be found useful.

P. N. R.

INTRODUCTION TO OPHTHALMOLOGY.—By Peter C. Kronfeld, M.D. 1938. Charles C. Thomas, Springfield, Illinois, Baltimore, Maryland. Pp. ix plus 331. Illustrated. Price, \$3.50

THIS introduction deals principally with the pathogenesis of disease. The details of diagnosis, of methods of examination, and of treatment have been omitted as the author considers they can be more effectively given in the form of oral instruction combined with demonstrations *in vivo*. A large number of common diseases have been omitted altogether from the book because they are unimportant according to the author for the exposition of ophthalmological principles. Short descriptions of these diseases will be found in the dictionary which is combined with the index of the book.

The book consists of 307 pages divided into 16 chapters dealing with an anatomical introduction, the diseases of the anterior adnexa of the eyeball, the diseases of the cornea, uveitis, endophthalmitis, the crystalline lens, injuries, the physiology of the retinal circulation, the vascular diseases of the eye, the intra-ocular pressure and its pathological variations, neoplasms, the optic nerve, the visual pathway, the pupil, the motor anomalies of the eye, refraction and finally an index and ophthalmological dictionary.

At the end of each chapter the author includes an extensive bibliography. The book is well written and amply provided with excellent illustrations, although pictures of external diseases of the eye have purposely been omitted as the author considers they are poor substitutes for the living specimen.

The book is different from the ordinary run of small textbooks on ophthalmology, contains much valuable information and forms most interesting reading.

We recommend it to students of ophthalmology as a book well worthy to be included in their library.

E. O'G. K.

HANDBOOK OF OPHTHALMOLOGY.—By Humphrey Neame, F.R.C.S., and F. A. Williamson-Noble, F.R.C.S. Third Edition. 1939. J. and A. Churchill, Limited, London. Pp. xiv plus 332, with 12 plates containing 46 coloured illustrations and 143 text-figures. Price, 13s. 6d.

THIS is the third edition of this handbook, which alone is sufficient evidence of its popularity and usefulness. The book is intended for undergraduate students and general practitioners. The authors have dealt with the diseases of the eye and its adnexa which are seen in the out-patients' department and have included brief descriptions of the commoner ocular conditions found among medical in-patients; they have

confined themselves to brief notes upon the uncommon affections and omitted all reference to the rarities of ophthalmology.

The book consists of 320 pages divided into eighteen chapters dealing with the examination of the eye and its surroundings, the refraction and accommodation, the eye-lids and lacrimal apparatus, injuries of the eyeball, the conjunctiva, the cornea and sclerotic, the iris, ciliary body and choroid, the lens, the vitreous, the retina, the optic nerve, the extra-ocular muscles, the orbit, operations, signs and symptoms in general, in the tropics and therapeutics. There is also an appendix on requirements of candidates for admission into the public services, a glossary and finally an index.

In the third edition the chapter on tropical ophthalmology has been modified and enlarged. A section on vitamins in diseases of the eye has been added to the chapter on general diseases.

A short article in the uses of contact lenses has also been included.

The book is excellently brought out and well supplied both with coloured illustrations and text-figures. It is written in clear simple style and we recommend it as a useful textbook for students and medical men working in India.

E. O'G. K.

A GLASGOW MANUAL OF OBSTETRICS.—By S. J. Cameron, M.B., F.R.F.P.S., F.C.O.G., John Hewitt, M.B., Ch.B., F.C.O.G., R. A. Lennie, M.D., F.R.F.P.S., F.C.O.G., and E. D. Morton, M.B., Ch.B., M.C.O.G. Third Edition. 1939. Edward Arnold and Company, London. Pp. viii plus 678. Illustrated. Price, 21s.

DR. CAMERON and his colleagues have written an excellent book. The authors indicate in the preface that their object is to provide 'a book which might prove helpful to the student and practitioner'. This object, we think, has been well achieved.

The views of the authors have been clearly expressed throughout the text. These are in accord with the modern and accepted ideas on the many subjects discussed. We note and appreciate the excellent résumé of such controversial subjects as the factors responsible for the onset of labour, use of pituitary extract in labour, and the very valuable description of the general treatment of puerperal sepsis with sulphonamides.

The chapters on radiology in obstetrics and the post-natal treatment by physiotherapy are novel features of this book. It is unnecessary to emphasize the importance of these subjects in modern obstetrics. The authors will earn the gratitude of all for whom this volume is meant.

We have little but praise for this book. We must, however, say that we cannot agree with the authors' recommendation of internal podalic version in a case with placenta prævia, nor should we put down in a students' textbook that 'It is quite proper to apply forceps to make a careful attempt at delivery with the patient in Walcher's position when a considerable portion of the head has passed the obstruction, although the longest diameters are yet above the brim'. These are perhaps the personal and well-tryed views of the authors, experienced as they are.

The book is well printed and bound. It is profusely illustrated with clear figures well chosen to describe the matter contained in the text.

It is an excellent book for the undergraduate and the obstetrician.

M. S.

THE EVOLUTION OF OBSTETRIC ANALGESIA.—By A. M. Claye, M.D. (Leeds), F.R.C.S. (Eng.), F.C.O.G. With a Chapter by W. S. Sykes, M.A., M.B., Ch.B. (Cantab.), D.A. 1939. Oxford University Press, London. Pp. 103. Price, 6s. Obtainable from Oxford University Press, Bombay and Calcutta

THIS compact little book describes in brief the efforts made to find a satisfactory drug, or combination of

drugs, to produce analgesia in childbirth, from the days of Simpson up to the present time.

There are chapters on ether and chloroform, scopolamine alone, scopolamine-morphine, the barbiturates and nitrous oxide, ethylene, and other inhalants. The barbiturates include nembutal, chloral, and pernocton.

The advantages and disadvantages of each are described, together with the technique of administration.

At the end of each chapter there is a comprehensive list of references for those who wish to follow the subject more fully, and who have the necessary access to medical literature.

This little work has much of interest and instruction for those who practise obstetrics, but it is not intended to be a comprehensive textbook on the subject of obstetric analgesia and anaesthesia.

The impression on reading it is that it could, with advantage, be expanded into such a textbook, to include analgesia administration by midwives, and anaesthesia for various obstetric operations. Such an expansion would add value to the book and little to its bulk, though a slight change in name might be necessary.

Finally, a mention of the cost of the apparatus described in the text, such as Minnitt's, would be of value to those in this country who have to administer hospitals with poor financial backing.

K. S. F.

DISEASES OF THE NEWBORN.—By Abraham Tow, M.D. 1937. Oxford University Press, London. Humphrey Milford. Pp. xviii plus 477. Illustrated. Price 27s. 6d. Obtainable from the Oxford University Press, Bombay and Calcutta

THIS study of the newborn infant is an attempt to co-ordinate the findings of the research worker and the clinician and is intended for the use of the general practitioner, the children's specialist and the obstetrician. The author is the professor of paediatrics at the New York Polyclinic. This book should prove useful for reference for it contains a great deal of compressed information, but although it contains references to cases in the author's experience the method of presentation lacks the illumination of the personal angle of approach and for this reason it makes rather dull reading. There is an extensive bibliography at the end of every chapter and for this reason alone the book is valuable.

M. N.

STUDIES ON THE SIZE OF THE RED BLOOD CELLS ESPECIALLY IN SOME ANÆMIAS.—By E. Mogensen. 1938. Oxford University Press, London, Humphrey Milford. Pp. 216. Illustrated. Price, 12s. 6d. Obtainable from Oxford University Press, Bombay and Calcutta

THIS book is the result of an elaborate study of principles and practice of Price-Jones' method of measuring the size of blood cells and of presenting his findings.

The author has followed Price-Jones' practice of taking the arithmetical mean of the two diameters of the cells in dried films measured by a method of projection. All his data, and some of Price-Jones', are subjected to the statistical method of examination and his conclusions are based on results of these examinations. On the whole he agrees with Price-Jones' conclusions and approves of his methods, but in a few instances he has pointed out weaknesses. He has introduced a method for decomposing heterogeneous Price-Jones' curves: this method, which is described, he has applied to all his curves.

Pernicious anæmia curves can be divided into three components, the main, the right, and the left component.

He has measured the cells and examined the data statistically in a number of different types of anæmia. In each case he has given his own results and discussed the findings of other observers.

Whilst one cannot help seeing the possibilities in this method of decomposing curves for purposes of

haematological research, the procedure seems to demand a little closer examination before its soundness can be accepted, as it means adding a new complication to an already laborious and complicated procedure.

Our main criticism of the book is that the author has attempted to cover too large a field: in many instances only a very few cases have been examined and his figures for normal subjects are often based on the examination of a very small number.

It is, however, a book which all interested in haematological investigations should study. To those who do not possess Price-Jones' book it has the additional value that it describes his methods in detail, and finally it has a very useful bibliography of over three hundred references.

L. E. N.

PHYSIOLOGY OF THE NERVOUS SYSTEM.—By J. F. Fulton, M.A., D.Phil. (Oxon.), S.B., M.D. (Harb.). 1938. Oxford University Press, London and New York. Pp. xv plus 675. Illustrated. Price, 25s. Obtainable from Oxford University Press, Bombay and Calcutta

THIS monograph is a lucid exposition of modern neurophysiology. The different chapters deal with the structure and functions of the different regions of the nervous system. Each chapter begins with historical notes and concludes with a detailed summary of the subject dealt with in the chapter; this summary will appeal to students. The author has included the recent advances in anatomy and physiology of the nervous system, particularly those relating to the receptors, the ventral and the dorsal nerve roots, the structure of the synapse, the cerebellum, the thalamus and its cortical projections, the hypothalamus, and the cytoarchitecture of the cerebral cortex. The physiology of the autonomic nervous system has been described in great detail.

Besides dealing with the structure and functions of the nervous system the monograph includes material that will be of help to students of clinical medicine, in the study of the diseases of the nervous system.

The get-up and printing of this volume are excellent. The book will prove valuable to the students of physiology and neurology.

P. C. S. G.

RECENT ADVANCES IN CHEMOTHERAPY.—By G. M. Findlay, C.B.E., M.D., D.Sc. Second Edition. 1939. J. and A. Churchill, Limited, London. Pp. x plus 523. Price, 21s.

A BOOK on chemotherapy dated 1930 is almost like a history of the world up to the time of the flood: this was the date of the first edition of *Recent Advances in Chemotherapy*, so that for all practical purposes the present edition is a new book.

Chemotherapy is a subject in which up to a few years ago tropical medicine definitely held a clear lead, but whether in the face of the happenings of the last three years in the field of the chemotherapy of bacterial infections this lead will be maintained seems very doubtful.

The author has not allowed himself to be overawed by this newer chemotherapy and, though the chapter on acute bacterial infections occupies nearly a third of the book, the other subjects have had their full share of attention. This chapter is however a very complete one and in the references are included the outstanding contributions from Domagk's first paper in 1935 to those that appeared late in 1938; the limitations as well as the triumphs of this new therapy are stressed and a number of sections are devoted to the rare but serious sequelæ, such as agranulocytosis and aplastic anæmia, to the administration of drugs of this group.

Of recent advances in the therapy of amœbiasis a good account is given and carbarsone is given an important place. There is a good summary of the newer antimonials, though in the treatment of leishmaniasis few compounds of importance have been introduced since the last edition. Fouadin is mentioned as of value in the treatment of *Dirofilaria*

immitis of dogs, but the only reference to its use in human filariasis is to record a failure. This has been the experience of most workers, though there is a popular theory amongst clinicians that it is of value. The chemotherapy of human filariasis does not seem to have begun yet.

The chapter on the chemotherapy of malaria is naturally an important one and one that has had to be completely rewritten since the advent of atebirin. A well-balanced account of the subject is given.

The practice of putting the references, not at the end of each chapter as is the usual practice but after each section of the chapter to which they refer, is a good one. These alone make it invaluable as a book of reference.

The writer has produced a very valuable contribution to a subject whose importance increases daily.

CLINICAL STUDIES IN PSYCHOPATHOLOGY: A CONTRIBUTION TO THE ÆTIOLOGY OF NEUROTIC ILLNESS.—By Henry V. Dicks, M.A., M.D. (Cantab.), M.R.C.P. (Lond.). 1939. Edward Arnold and Company, London. Pp. 248. Price, 12s. 6d.

IN the preface the author states that the material and most of the subject-matter of the book, originally formed a series of post-graduate lectures at the Tavistock Clinic. The Tavistock Clinic is to be congratulated on having Dr. Dicks on its staff, for his book is one of the most penetrating works on psychopathology that has appeared in English for a considerable time. The author is a practising psychoanalyst with a profound, but by no means blind, admiration for the venerable founder of psycho-analysis. In actual practice the author adheres to certain modifications of orthodox psycho-analytical procedure as introduced by Dr. J. A. Hadfield. The author is very emphatic on the part played by the mother in regard to the formation in later life of a neurosis in her child, particularly in a female child. Indeed, Dr. Dicks goes so far as to state that it might be of real psychopathological and sociological value to investigate systematically the types of parent and their relationship to each other in conjunction with the various psychogenic disorders. The records of child guidance clinics, the author thinks, ought to provide ample material for such an enquiry. Each theme is illustrated by one or more clinical histories. The author's treatment of sex dysfunction is particularly interesting, as is also his discussion of drug addiction and its treatment. In the last chapter the author strikes a hopeful note as regards the future of psychological medicine. He writes: 'The time is not now so far distant when the corpus of medicine will once again achieve its own "psychosomatic unity"'. That it ever became dissociated, was partly due to the unwholy fascination of the illusion of magical omnipotence that test-tube and microscope conjured up in the last century, which made the independent study of mental—that is to say properly human—phenomena barely even worthy of contempt in the eyes of the pundits'. To this view all psychiatrists will heartily subscribe.

THE HEALTH OF THE NATION AND DEFICIENCY DISEASES.—By John Maberly, M.R.C.S. (Eng.), L.R.C.P. 1938. Baillière, Tindall and Cox, London. Pp. xi plus 118. Price, 5s.

IT is very difficult to decide why, and for whom, the author wrote this book. Did he mean it for popular, or for medical consumption? If the former, why does he include so many prescriptions and references to medical literature, and go into such minute details about the ætiology of pernicious anæmia? If the latter, well . . . the qualified practitioner can look after himself, but we must warn the student that reliance on the information on the subjects touched upon in this book will head him straight towards failure in his examinations. The author's preface does not help one much; this leads one to think that he is going to revive the thirty-year-old newspaper 'stunt' regarding 'deadly white bread', but if this was his intention he

allowed himself to be led down side-tracks and lost sight of his original purpose. Here he also refers to the 'ruling authorities' in the East who allow the milling of rice despite the fact that they know the deadly results of this practice; this led the reviewer to hope that possibly some fresh light was to be thrown on this important problem, but there are only two short pages devoted to beri-beri and rice, and the information given is rudimentary and scrappy, and could be found in almost any textbook of medicine.

The chapter headed 'The Discovery of the Vitamins' looks promising, but it is found to consist of less than a page and a quarter of print and even this has not been used to the best advantage. He refers to the work of Lunin, of Stepp, and of Eijkman and, then he credits Casimir Frank (sic) with introducing the term vitamin; the only other name mentioned is Sir J. G. Hopkins. The concluding sentence in the chapter is 'The name vitamin B was attached to the anti-beri-beri element, and the five chief vitamins were gradually isolated as vitamins A, B, C, D and E'.

His chapter on maize and pellagra is innocent of any reference to nicotinic acid. He doubts the vitamin deficiency theory of pellagra; this conclusion appears to be based on the fact that, if you give a horse a feed of maize overnight, he is liable to bolt with you when you attempt to mount him next morning.

There are references to medical journals and books. These are sometimes given in detail in the text and repeated in the list at the end; on other occasions, they are included in the list but not referred to at all in the text. The references, as references, are in many instances inadequate.

It seems just possible that the uninformed non-medical reader might find the book of some interest.

L. E. N.

ESSENTIALS OF MEDICINE.—By Charles P. Emorson, M.D., and Nollie Gatos Brown, R.N. Thirtieth Edition. 1938. J. B. Lippincott Company, Philadelphia and London. Pp. xxii plus 845. Illustrated. Price, 12s. 6d. Obtainable from Butterworth and Company (India), Limited, Calcutta. Price, Rs. 9-6

THIS book gives the medical student or nurse an excellent groundwork on which they should be able to build their further knowledge.

Not only does this work deal with the commoner diseases and their treatment, but also, in the first chapter, gives him a brief outline of the anatomy, physiology, bacteriology, chemistry, and physics which the beginner cannot fail to understand with ease. There is also a most praiseworthy chapter on the observation of the patient, a subject to which both students and nurses could well afford to give more attention than is commonly done.

The remaining chapters dealing with the diseases of the different systems consider first, in each case briefly and clearly, the anatomy and physiology of the respective systems, and here the accompanying diagrams render the descriptions very easy to follow.

The student is nowhere worried with any difficult theories, and in each case only the important points in treatment are emphasized.

It must be realized, however, that this book has been written essentially for students and nurses in America, and therefore those studying in this country will have to supplement their reading in certain instances. Thus in the chapter on blood diseases no mention is made of tropical macrocytic anaemia, and there is only a small paragraph on anemias of pregnancy. Again, when writing on tropical diseases, for the treatment of malaria, quinine is the only drug mentioned, and the term estivo-autumnal has no advantage over malignant tertian in the classification of malaria.

This book covers the essentials of medicine in a very lucid way and can be recommended to all students and nurses.

PHYSICAL DIAGNOSIS.—By R. C. Cabot, M.D., and F. D. Adams, M.D. Twelfth Edition. 1938. Baillière, Tindall and Cox, London. Pp. xxii plus 846. Illustrated. Price, 22s. 6d. Postage inland, 7d. Postage abroad, 1s. 10d.

THE eleventh edition of this book which appeared in 1934 was kept approximately the same size as earlier editions by the omission of laboratory tests and data to permit of additions owing to the many advances that had taken place. Exclusive of the index this edition was just over 500 pages and the twelfth edition which has just been published has nearly 800 pages.

This is an indication of the great advances that have been made in diagnostic methods in recent years, but the increased size is not altogether due to this alone, because two new chapters have been added at the beginning of the book, the first an exhaustive discussion on how a history should be taken and a shorter one on general advice regarding how to conduct a physical examination.

Until the appearance of this edition the author had written the whole book himself and only included diagnostic methods of which he had personal experience. This was perhaps possible in a clinician of his great experience, but he now has to admit that good and necessary methods in modern diagnosis are being too rapidly added to be assimilated and thoroughly understood by a single individual so he has wisely called to his aid his colleagues of the Massachusetts General Hospital and has shared the burden of editorship with Dr. R. Dennette Adams. The result of this collaboration has been a much improved and much larger production which can be confidently recommended as a book of reference.

As in the earlier editions, the numerous, well-chosen and beautifully reproduced illustrations are an education in themselves and a great deal can be learnt from them without reference to the text.

P. A. M.

ADVENTURES IN RESPIRATION: MODES OF ASPHYXIATION AND METHODS OF RESUSCITATION.—By Yandoll Henderson. 1938. Baillière, Tindall and Cox, London. Pp. xi plus 316. Illustrated. Price, 13s. 6d.

THIS book mainly deals with modes of asphyxiation and methods of resuscitation. In the earlier chapters the author has discussed the rôle of oxygen and carbon dioxide in the physiology of the human system and the modern principles of shock and acapnia. The discussions on the fallacy of asphyxial acidosis and on the phenomenon of acardia deserve special mention. The book was read all through with great interest, especially the chapters dealing with mountain sickness and acclimatization, carbon monoxide asphyxia, asphyxia of the newborn and their resuscitation. The book contains a mass of information on different subjects. Incorporation of results of the author's own experience and investigations on the various lines has made the volume more attractive. It has depicted the real place of carbon dioxide in medical science. The bibliography at the end of the book is very valuable.

P. D.

MEDICAL JURISPRUDENCE.—By M. A. Kamath, M.B. & C.M. Fourth Edition. 1938. Butterworth and Company (India), Limited, Calcutta. Pp. ix plus 343. Illustrated. Price, Rs. 6.

A SMALL book like this should be all a medical student needs.

The treatment of the judicial procedure, legal responsibilities of a medical man and medical ethics is brief yet complete. Younger generations of medical men, however, would not safeguard their own interests by obtaining another practitioner in consultation by 'some pretext or other' in a case of suspected attempt at abortion. Neither would they in cases of doubt get 'on the safe side' by sending to the authorities communications marked 'private and confidential'.

Enough is given under toxicology to tell a medical man what aid can be expected from a chemical examiner.

Not all instances illustrating exceptions to the rules based on the considered opinion of the majority of medicolegal experts are taken from scientific publications. Many of them should be discarded.

The narrative is involved at times. Rectification of this defect will mean considerable labour but is worth undertaking in the next edition.

Blood groups and their bearing on forensic medicine constitute a serious omission which should not occur in the next edition.

Only two printer's errors attract attention. On page 65 *aviscus* should be a *viscus*, and on page 249 *Burkenhead* should be *Birkenhead*.

The size, the paper, the printing and the binding are good. The price is reasonable.

S. D. S. G.

Abstracts from Reports

THE EIGHTH ANNUAL REPORT OF THE ASSOCIATION FOR THE PREVENTION OF BLINDNESS, BENGAL, 1937-38

INTRODUCTION

THE Committee of the Association for the Prevention of Blindness, Bengal, with great pleasure present the Eighth Annual Report of the Association and it is gratifying to report the very satisfactory progress that has been made during the year, and encouraging to know that its activities have met everywhere with great enthusiasm due to the wonderful work it has accomplished in the prevention of blindness and the relief of human suffering.

Appeals for assistance were received in large numbers from different parts in and outside of Bengal but many had to be turned down on account of limited financial resources.

The main feature of the year was the work done by the two travelling dispensaries. As pointed out in the last annual report, in addition to the Jubilee Travelling Eye Dispensary a Second Travelling Eye Dispensary was started in East Bengal in August 1937. This dispensary commenced work in the Mymensingh District under the care of Dr. C. R. Chakraverti, and during the rainy season a boat was used instead of a motor ambulance as parts of the district were only passable by rivers. Later, as the rivers commenced to dry up, the boat was dispensed with and the dispensary was moved about by rail and country carts. The medical officers of these dispensaries carried out propaganda work in the prevention of blindness and care of the eyes by means of lantern lectures, demonstrations, cinemas, posters, pamphlets, etc. These medical officers are fully trained eye specialists and in addition carried out curative work in restoring sight to the blind. Operative work was carried out in the sub-divisional hospitals or in buildings improvised as hospitals. All operative work ceased a week before the dispensary was due to move on. A travelling eye dispensary can only stop for a period of about three months and it was often pathetic to have to refuse the appeals of the inhabitants for an extension of its stay in the district but owing to lack of sufficient money an extension could only be granted when the local community put up the money to pay for its upkeep.

During the year the Jubilee Eye Dispensary was under the direction of Dr. S. K. Das and worked in the districts of Jessore, Nadia and Dinapur, and the Travelling Eye Dispensary No. 2 worked in the Mymensingh District. The No. 2 Travelling Eye Dispensary was started in August 1937 and placed under the charge of Dr. Chakraverti, who was transferred from the Jubilee Dispensary to initiate the smooth working of the unit and very ably he has carried out his duties. So popular was this medical officer and so successful was his work that extension after extension had to be given to cope with the huge rush of patients and the local public contributed in full for the maintenance of the dispensary. Glowing tributes were paid of its magnificent work by officials and the public of the district.

In the campaign for the prevention of blindness it is perhaps not yet realized that the problem is

largely one of the prosperity of the people and the great bulk of preventable blindness will gradually diminish as the standard of living improves. If the standards of living throughout India were the same as in Europe, then the problem of blindness would be the same as in other countries in Europe. Speaking broadly, the prevention of blindness in India is not only a medical problem but a social, economic and financial one. All of India's major problems to-day including prevention of blindness resolve themselves into or are closely connected with the education of the masses the greater number of whom are the cultivators of the soil. During the year under review many comprehensive schemes have been launched by Government for rural uplift and natural constructive work to improve the conditions of the life of the villagers. Large sums of money are being spent to provide good water supplies, improved methods in the breeding of cattle, union board dispensaries, village schools, libraries and playing grounds. The fulfilment of these schemes must lead to a general improvement in the health of the people and as a necessary corollary a diminution in the amount of preventable blindness.

The common causes of blindness in Bengal are apathy, neglect and ignorance. How are we to overcome these enemies? This must come from mass consciousness and will be an up-hill task and will not succeed unless there is a re-awakening amongst those who are now economically at the bottom. Foremost in this task is the co-operation of popular government and the people, the use of modern aids to education, such as by lectures, through the radio and the cinema before much can be done in such a vast country as India.

It is a matter of great satisfaction that the Government of Bengal has approved of the work carried out by the Association in the campaign for the prevention of blindness and has given a grant of Rs. 10,000 for the coming year.

The problem of prevention of blindness in general is so immense, it is important to face facts and realize that the remedy cannot be successful for many years and that the most important work of the Association for the prevention of blindness in Bengal is to bring home to the members of the administration and the people in general the importance of prevention of blindness and the care of eye diseases and suggest remedies for prevention and cure.

Looking back on what has been accomplished by the Association in the last eight years, considering its meagre resources, the committee have every reason to congratulate themselves on the success obtained in this noble work.

ANNUAL REPORT OF THE INSTITUTE FOR MEDICAL RESEARCH, FEDERATED MALAY STATES, FOR THE YEAR 1937. BY A. NEAVE KINGSBURY, DIRECTOR

GENERAL REVIEW

DURING the year under review there have been periods of considerable pressure on the divisions concerned with the preparation of prophylactic biological products. Towards the end of June cases of cholera among the immigrants from India were trapped at the

quarantine stations of Port Swettenham and Penang. In August infected ships from China arrived in Singapore; but in all instances the quarantine barrier was successful in preventing the spread of infection to the country at large. There were heavy demands for cholera vaccine from the quarantine stations and it was deemed desirable as a precaution to increase the stocks of that vaccine to a high level. The staff of the Division of Bacteriology responded excellently and the institute was shortly in a position to meet all reasonable requirements.

A second emergency arose in September: Singapore had been previously free from rabies for a long period, but during August an imported dog developed that disease. Other canine cases followed and it was decided to subject all dogs on the island to prophylactic vaccination. The canine population was computed to be 13,000 and between September and November thirty-eight water buffaloes were inoculated intracerebrally with 'fixed' virus for the preparation of vaccine. Certain modifications were introduced in the technique: a lymph grinding machine was utilized instead of pestle and mortar with consequent improvement in the suspension and reduced risk of bacterial contamination. Deliveries of the canine anti-rabies vaccine to the veterinary authorities in Singapore were effected according to time-table.

Vaccine lymph.—The demands rose sharply in July and continued at a high level until September—the total output was about 30 per cent higher than the annual average. The potency of a few batches prepared in 1937 proved to be somewhat low and a fresh supply of seed lymph was obtained from the Bandoeng Institute. However, the application of this seed lymph and our own 'calvine' to different areas of an animal yielded lymphs of about equal potency. It is now the practice, whenever the potency of a lymph does not exceed 1/2,000, to blend it with another batch of high potency before issue for general use.

Considerable progress is to be recorded in the various researches undertaken. The findings of Mr. E. P. Hodgkin had shown that filariasis presented a serious problem in the vicinity of the Bernam river and reports had been received of its endemicity in certain areas of Perak and Pahang. Dr. J. O. Poynton was therefore appointed as Research Student to investigate the distribution, ætiology and treatment of the disease, while Mr. Hodgkin continued his work on the entomological problems involved in transmission.

Dr. Poynton has established that infestation is widespread among the riverine population of Perak, particularly along the Perak river from Parit to within a few miles of the sea and on the Kinta and Dedap tributaries. He estimates that about 1 per cent of the population (some 50,000) have elephantiasis and that about 2 per cent more are infested. In Selangor the number of cases of elephantiasis is in the region of one hundred. Endemicity is high along the Pahang river from Labak and Triang to Kuala Pahang and cases are found on the Kuantan and Rompin rivers. The *mukims* of Pahang Tua and Pula Rusa are particularly heavily infested; about 12 per cent of the population of the former have elephantiasis or lymphangitis and some 30 per cent of the remainder have microfilaria in their blood.

Though occasional infestations with *Wuchereria bancrofti* were found, mainly in immigrants, it is believed that the local transmission of this species is relatively unimportant. The large majority of the infestations in rural areas are with *Microfilaria malayi*. The opportunities afforded by the numerous visits to *kampongs* were utilized to commence a nutritional and to extend the tuberculosis survey.

The researches undertaken by Mr. E. P. Hodgkin indicate that *Mansonia uniformis* and *M. longipalpis* are the principal local vectors of *Mf. malayi*, though *M. annulifera*, *M. annulatus* and *M. indiana* were found by experimental feeding to be susceptible to infection. From India there are reports of the control of transmission by the eradication of the water plant *Pistia stratiotes*, but in Malaya only *M. annulifera* commonly breeds in connection therewith and, as that species

seems to be relatively unimportant in transmission, the local eradication of this water plant would serve little useful purpose. *M. uniformis* breeds on the water hyacinth *Eichornia crassipes* but also in association with other water vegetation. A few larvae of *M. longipalpis* have been found with *M. uniformis* on the water hyacinth but the former species abounds in swampy jungle and the situation of its major breeding places is yet to be determined. The breeding of *M. uniformis* could probably be controlled in open swamps by drainage and proper cultivation. At present the intensity of *Mansonia* mosquitoes in some *kampongs* is such that five hundred have been taken nightly in a single trap. The infection rate, based on the present dissection results, is in the order of 1 per cent. A large number of mosquitoes have been applied to carriers of *Mf. malayi*, *W. bancrofti* and *D. immitis* in order to identify the susceptible species, and to establish, if possible, distinctive morphological characteristics that would assist in the identification of these worms in various stages of development within the vectors.

After numerous and extensive experiments with chemo-prophylaxis by Drs. J. W. Field and J. C. Niven, the Malaria Research Division is now in a position to define the minimum effective prophylactic dose of atabrin. The smallest effective quantity of atabrin for the control of clinical malaria in adults is 0.3 gramme given as a single dose at weekly intervals. The cessation of prophylaxis has, however, again been followed by an alarming and almost explosive recrudescence of malarial attacks. Under local estate conditions chemo-prophylaxis may be compared with the gauze of the old-time miner's safety lamp in a dangerous atmosphere; the flame of infection is confined but on removal an explosion seems almost inevitable.

Therapeutic tests of Totatquina II have been extended: the treatment of large series of cases of benign and malignant tertian malaria with Totatquina II and with quinine has shown that these two drugs are about equal in clinical value. It proved to be no more toxic, while its cost is about half that of quinine hydrochloride and three-quarters that of quinine sulphate. Totatquina is thus an effective anti-malarial remedy and can be safely substituted for quinine with a consequent considerable saving in expenditure.

Other preparations, 'Paludex', 'Homaline I' and 'Prontosil', have been tried but with disappointing results. Tests on guinea-pigs relative to the toxicity of atabrin have been undertaken. Injections up to sixteen times the relative human dose have been made—some after preliminary starvation to reduce glycogen—and in no case has damage to the liver, cardiac muscle or other organ been found.

The trapping of anophelines and larval surveys have been continued by the Entomological Division, working in conjunction with the Malaria Research Division. Mr. Hodgkin has taken a number of infected *A. novumbrosus* and this species must now be added to the long list of local vectors of malaria. It is a jungle swamp breeder and on the estate concerned was as important a vector as *A. umbrosus* during the year under review.

Experiments have been continued with the new oiling mixture with interesting results. Field trials by health officers and others have been undertaken and are still in progress. The few reports so far available are, with one exception, favourable. The adverse comment followed an outbreak of malaria but unfortunately detailed records of larval surveys are not available.

In the Division of Pathology, Drs. Lewthwaite and Savor have continued their researches in connection with typhus-like fevers. Strains of 'rural tropical typhus' or *tsutsugamushi* (Japanese river fever)—for these two clinical entities are now considered to be caused by the same virus—were isolated from wild rats in 1931. In the past year attempts have been made to obtain strains of 'urban' (X. 19) tropical typhus from rats taken in urban surroundings. Two strains were isolated by the inoculation of brain, etc., into

vitamin-deficient guinea-pigs and have been studied in various laboratory animals.

The search for an effective prophylactic vaccine has been continued. Wieg's vaccine, obtained from the intestines of lice infected with typhus exanthematicus, has been tested in guinea-pigs for protection against 'urban' and 'rural' (Japanese river fever) tropical typhus, but has been found to be ineffectual. Various modes of preparation of a vaccine from ascitic fluid heavily infected with *Rickettsia* have also been tried. Treatment by storage on ice and at room temperature for various periods with subsequent addition of methylene blue and exposure to radiation from a 'Pointolite' lamp has given interesting results. About one-third of the test animals had a mild reaction following vaccination. On later test inoculation of virus, the twenty-five guinea-pigs of various series that had not reacted were found to include three with complete and two with partial immunity, while the mortality rate among the vaccinated animals was only 10 per cent as compared with 95 per cent among the non-protected. Other methods of preparation—dissication, ageing, coating with yolk of egg, lanoline and olive oil—have also been attempted; up to the present, the findings, though interesting, have not been highly encouraging.

Although the use of 'Vi' antigen in the diagnosis of the enteric carrier state has not yet been explored by the Division of Bacteriology, Dr. R. Green records much work on the value of 'O' agglutinins. The analysis is based on nearly 1,500 cases; four cases of typhoid fever had been traced to an eating shop where the cook had 'O' agglutinins to between 5 and 10 units. For these purposes, however, the test has only limited value; it is useful in the diagnosis of early and symptomless cases but the presence of 'O' agglutinins and the excretion of *B. typhosus* do not necessarily coincide.

A survey of cholera in the Federated Malay States during the past thirty years is also given, including notes on bacteriological diagnosis and the present technique for vaccine production. Dr. Green invites attention to cases from which enteric and dysentery organisms, or dysentery organisms of more than one species have been isolated.

A still further expansion of some 6 per cent in the number of routine examinations is reported from the Division of Chemistry. The chief chemist invites attention to the danger of lead poisoning from the practice of the utilization of solder in the place of tin for the 'tinning' of the interior of the cheaper brass and copper cooking pots. He also sounds a note of warning with regard to the practice of storing water overnight in such pots or in soldered cans or in stone-ware jars, many of which have lead glaze: local waters are often plumbosolvent.

The Ipoh Branch Laboratory experienced a very busy year for the number of routine specimens totalled nearly 30,000—an increase of some 30 per cent—this pressure necessitated the deferring of certain investigations that had been planned. A little progress was made in the tuberculosis survey, and 1,670 Perak children have now been subjected to the tuberculin test. With some thousand urban children, positive results have been encountered in 53 per cent of 516 Chinese, 33 per cent of 470 Malays, 18 per cent of 68 Tamils, and 23 per cent of 51 Sikhs of various age groups.

In connection with a report on laboratory examinations following a health survey of a group of Sen-Oi Sakai, Dr. Nevin also includes some interesting sociological observations. Blood films were taken in the day-time for a malaria survey and 10 per cent of them were found to contain microfilaria. An almost universally high eosinophilia led to a search for helminth ova and 70 per cent of the group proved to be infested with *Ascaris lumbricoides*, 26 per cent with *Ankylostome duodenale* and 14 per cent with *Trichuris trichiura*.

Progress has been made with the rat virus enquiry. Herd experiments with *P. aviseptica*, *P. cuniculiseptica*, *P. muriseptica*, *S. enteritidis*, Medan, Liverpool and

Ratin, and infectious ectromelia have confirmed that there is little possibility of precipitating an epidemic among local rats by means of these agents. However, when a selected strain of *S. enteritidis*, cultured in milk, was fed to batches of rats the subsequent death rate in two separate experiments were 87 and 80 per cent. This strain is thus effective for rat extermination, but it is pathogenic to man and consequently its employment is inadvisable wherever there may be possibility of contamination of food or of water supplies. Certain commercial rat 'viruses' and poisons have been examined; none of the viruses and few of the poisons have proved to be really effective.

UNIVERSITY OF CALCUTTA. EIGHTEENTH ANNUAL REPORT OF THE STUDENTS' WELFARE COMMITTEE FOR 1937-38

The medical board attached to the students' welfare committee visited the following institutions during the year 1937:—

- (1) Hindu Academy,
- (2) Bowbazar High School,
- (3) Mitra Institution, Bhowanipur Branch,
- (4) South Suburban School (Main), Bhowanipur,
- (5) Ashutosh College, Bhowanipur, and examined the health of 2,777 students (college students 354 and school students 2,423). This brings the total number of students examined to 37,043.

Each student examined was supplied with a report on the state of his health. A copy of the report was forwarded to the institution concerned for information and a third copy was preserved in the department for reference and investigation. This new arrangement, introduced during the year under consideration, has added considerably to the routine work of the office. But the additional work will be amply repaid if it induces the student to take a greater interest in his health and to utilize the facilities offered by the committee for health preservation to a larger extent. In addition, separate reports on the state of health of the students examined were sent to the institution concerned shortly after the completion of the medical examination. These reports contained a list of students found to be suffering from any disease or defects together with the recommendation suggested for rectifying them.

The proportion of students suffering from diseases or defects requiring immediate attention was 41.6 per cent as compared with 53.6 per cent for 1936 and 63 per cent for 1935. This is the lowest percentage as yet obtained and indicates that there has been a perceptible improvement in the health of the students. The following table gives an analysis of the findings of medical examination:—

TABLE I

Name of diseases	Figures for college students given in percentage (number of students 354)	Figures for school students given in percentage (number of students 2,423)
Defective vision	38.13	30.14
Malnutrition ..	23.44	31.11
Enlarged tonsils	1.69	10.94
Caries (dental)	7.06	20.98
Skin diseases ..	1.97	3.96
Lung diseases ..	1.34	2.02
Enlarged liver ..	9.28	1.03
Enlarged spleen	0.56	0.74
Pyorrhœa ..	1.12	0.45
Heart disease ..	..	2.80

There has been a decline in the incidence of diseases on all heads except affections of the lungs, and heart and of pyorrhœa. The incidence of malnutrition has come down this year to 23.4 per cent among college students and 31.1 per cent among the school students, i.e., much below the usual figures found in other years. The decline in the incidence of malnutrition indicates that the students and their guardians are taking a

greater interest in the preservation of health. The incidence of students requiring immediate medical attention has declined from 66 per cent for the triennium 1920-22 to 41 per cent for 1937. This general improvement of students' health seems to indicate that the work of the committee has begun to yield the results hoped for when it first began its work in 1921. The effect of the last recrudescence of epidemic dropsy in Calcutta is still distinctly seen in the higher incidence of affections of the heart among both groups of students.

REPORT ON THE STATE OF PUBLIC HEALTH IN BURMA DURING 1937

The major epidemic diseases in Burma are cholera, plague and smallpox. All the three are preventable. Under the present system responsibility for efficient measures for the suppression of epidemic diseases rests with the local bodies concerned, i.e., municipalities and district councils. The occurrence of any of these diseases in epidemic form is a reflection on the local administration concerned. In past years ignorance and apathy on the part of the public have made preventive measures difficult, but signs are not wanting that there is a slow but steady change and that, if those in authority take the lead, public response does follow.

Cholera.—During the year from the whole of Burma there were reported a total of 3,491 deaths from this disease. This gives a provincial death rate of 0.29, which is a rise of 0.21 over the previous year's rate and 0.13 over the five-year mean.

Plague.—There was a total of 1,526 deaths from this disease during the year. The provincial rate for the year under review is 0.13 which is 0.06 below the previous year's rate and 0.01 below the five-year mean. Arakan Division was entirely free from this disease as usual, and seven other districts reported no mortality from it during the year. The most important town that is affected by this disease is Mandalay in which it has been occurring for many years in bi-annual epidemics. In 1936 there were 624 deaths from this disease and in the year under review 210.

Smallpox.—During the year under review the total number of deaths from this disease was 1,370, of which 138 occurred in children under one year of age and 281 in children over one year and under 10 years of age. The provincial rate is 0.11 which is the same as last year and is 0.03 below the five-year mean. The disease was most prevalent during the period January to May and gradually declined towards the close of the year. Mortality was reported from every district except Kyaukse and Yamethin.

MEASURES DIRECTED AGAINST EPIDEMIC DISEASES

Education is carried out by means of cinema shows, magic lantern demonstrations, lectures and the distribution of leaflets which work is undertaken by the Hygiene Publicity Bureau and the district cadre of the Public Health Department.

Enteric fever.—In many countries the incidence of this disease is taken as the sanitary index by which the efficiency of public health measures in a town can be judged. This is not possible in Burma as we have no true record of its incidence owing to the lack of accurate bacteriological investigation of cases, therefore, there are no accurate statistical data from which to draw conclusions by comparison.

Dysentery and diarrhoea.—The total number of deaths from this disease reported during the year was 6,987. This gives a provincial rate of 0.58 which is higher than last year and 0.13 in excess of the five-year mean. As in previous years the highest number of deaths from this condition was reported in the month of July when 1,137 deaths were recorded.

Respiratory diseases.—A total of 13,907 deaths from respiratory diseases was reported during the year which is a slight increase over last year though the rate, 1.15, remains the same. It is considered that statistics with regard to these conditions are fairly accurate for urban areas but are, inevitably, inaccurate for rural areas.

Beri-beri.—The incidence of this disease in districts can only be roughly gauged from the reports of district health officers and from requests for assistance to deal with it made on this department from large employers of labour. Rangoon had 86 deaths during the year under review which is the same as in the previous year though the number of cases 174 is slightly lower than that of 1936. Bassein reported 17 deaths while from towns from the rest of the Irrawaddy Division there were a total of 20 deaths reported. Mergui reported 25 deaths which is a very considerable increase over the previous year's figure of 21. As in previous years this disease continued to appear mostly in members of the Indian community.

Cerebrospinal fever.—This is the first year in which this disease has been reported in epidemic form in Burma. It appears to have started in a village near Kalembo in Upper Chindwin District, thence it spread to Haka Subdivision of the Chin Hills District. The district health officers and the civil sub-assistant surgeons concerned made every effort to cope with this problem. It presented great difficulties as the area is very wild and inaccessible and the people are very ignorant and superstitious. Reports of deaths were often received many days later so that the collection of accurate information as to what really had happened was very difficult. At first this department inclined to the view that it was influenza coupled with malaria and not cerebrospinal fever. However the care with which the medical officers concerned recorded observed and hearsay symptoms eventually established the diagnosis beyond doubt.

Malaria.—Malaria kills more people and does more damage to physical, social and economic welfare in rural portions of Far Eastern countries (especially in the tropics and sub-tropics) than any other disease. Yet malaria is insidious, and except in epidemic form, it does not manifest itself with dramatic power sufficient to attract attention and funds commensurate with its ability to destroy health and prosperity. The above remark made by the Malaria Committee of the Inter-Governmental Conference of Far Eastern Countries on Rural Hygiene, held in Java in August 1937, is, unfortunately, as true of Burma as of other countries of the East and the Far East.

Veneral diseases.—The exact extent of this problem is not known, but that it is an important major problem is the opinion of all civil surgeons and district health officers. Most unfortunately it is not clearly appreciated in this country that the evil effects of these diseases do not terminate with their manifestations in those afflicted but are liable to recur in the generations yet to come. Seventy-three thousand eight hundred and ninety-eight persons were treated for venereal diseases during the year under report, of whom 34,381 were suffering from syphilis and 26,628 from gonococcal infection, the remainder having other diseases of venereal origin. The number of deaths that took place in hospitals from syphilis and gonorrhoea are 55 and 9 respectively, but in those towns where deaths from these two conditions are registered, the corresponding figures are 322 and 15. The very grave disparity between these two sets of figures shows clearly that the number of patients treated in hospitals is a small percentage of those actually suffering from these diseases. In Rangoon general hospital out of 788 post-mortem examinations carried out during the year, signs of syphilis were detected in 123, while venereal infection was traced in 467 cases out of 2,880 admissions into the four maternity and infant welfare shelters in Rangoon.

Leprosy.—Three hundred and fifty-seven deaths were reported from this disease during the year under report. There is, however, no doubt that it is a much more serious problem than would appear from these figures. The fact is that mortality from leprosy is recorded only in towns, and therefore we have no real information as to its incidence. The problem is not easy and it is not believed that the extension of compulsory notification would necessarily yield the information desired. Compulsory notification of this disease, which at present is only in force in Mōnywa and Maymyo,

might result in even more evasion than exists at present with voluntary measures.

Tuberculosis.—It is impossible to state with any accuracy how many die each year in Burma from tuberculosis as the figures as a whole are not sufficiently complete and undoubtedly many deaths from this disease are undiagnosed and unreported. From such figures as are available there is little doubt but that this disease presents a problem of ever-growing importance to the people of Burma. The history of tuberculosis shows that a heavy incidence may be expected where an agricultural population turns towards city and factory life. This factor is not present to any marked degree in Burma so it is reasonable to hope that energetic preventive and curative measures should meet with success in reducing the total morbidity and mortality from this disease. If we could achieve careful isolation and treatment of the individual case coupled with a suitable regime of home life for contacts we should have gone far towards eliminating this disease. This is axiomatic in any country but there are reasons to suggest that, though difficult or impossible to accomplish elsewhere, it could be managed in Burma.

ANNUAL REPORT OF THE SANITARY BOARD, BENGAL, FOR THE YEAR 1937

IMPROVEMENT in the financial condition of the province enabled Government to revert to the policy of making grants towards water-supply, drainage and sewerage schemes. Although, in the absence of any matured schemes, no part of the provision made for this purpose was actually availed of by local bodies during the year, the revival of the grants resulted in definite encouragement to local bodies to undertake sanitary engineering schemes.

The total expenditure on water-supply, drainage and sewerage schemes recorded a further rise during the year. The expenditure on waterworks amounted to Rs. 7,50,326 and that on sewerage to Rs. 1,52,027 as against Rs. 5,70,472 and Rs. 56,649 respectively in the previous year.

Sketch projects for schemes estimated to cost Rs. 28,04,250, detailed projects to the estimated value of Rs. 12,25,298, and detailed estimates and plans for miscellaneous works amounting to Rs. 51,268 were drawn up during the year under review. Investigation and preparation of sanitary engineering schemes may thus be said to have made good progress.

The chief engineer, public health department, reports that all the six municipal towns which have recently constructed waterworks have adopted the decentralized storage system.

In order that all works of water-supply for domestic purposes as well as all sanitary and drainage projects in the rural areas may receive the necessary amount of expert supervision, the chief engineer has been appointed inspector of local works for this purpose. All tube-well projects proposed to be financed from the Government of India grants for rural uplift were, under orders of Government, referred to the chief engineer for previous approval. After examining the schemes, the chief engineer gave suitable instructions for sinking and maintenance in each case.

In his report the chief engineer has alluded to the advance which has been made in the matter of converting indifferent tube-well water into first class drinking water by treating the water according to a number of comparatively inexpensive processes.

The department continued to render valuable assistance to the municipal bodies and other local authorities by way of inspection, advice and supervision and the local bodies, on the whole, readily co-operated with the department.

The sanitary board, held four meetings during the year and examined various engineering and public health schemes before forwarding them to Government. The board also reviewed the inspection reports of departmental officers and gave useful advice. A sub-committee was appointed by the board during the year under review to investigate whether the introduction of water-supply in towns without provision of effective drainage had led to an increase in malaria and to consider what steps should be taken if the data obtained indicated any appreciable rise in the incidence of malaria in such cases.

Service Notes

APPOINTMENTS AND TRANSFERS

COLONEL D. F. MURPHY, M.C., to be Officiating A. D. M. S., Deccan District. Dated 24th January, 1939.

Colonel W. A. M. Jack, O.B.E., to be Officiating A. D. M. S., Rawalpindi District. Dated 5th January, 1939.

Lieutenant-Colonel A. N. Sharma to be O. C., No. 7 Field Ambulance, Razmak. Dated 15th February, 1939.

Lieutenant-Colonel W. C. Spackman returned from leave and resumed charge of the duties of Professor of Midwifery and Gynaecology, Grant Medical College, and Senior Specialist in Obstetrics with Gynaecology, Bai Motlibai and Sir D. M. Petit Hospitals, Bombay, with effect from the forenoon of the 3rd February, 1939.

Lieutenant-Colonel J. B. Hance, C.I.E., O.B.E., an Agency Surgeon, on return from leave, resumed charge of his appointment of Residency Surgeon, Mysore, with effect from the forenoon of the 1st January, 1939.

Lieutenant-Colonel A. C. Craighead to be A. D. P., Southern Command. Dated 26th December, 1938.

Lieutenant-Colonel F. Phelan to be Officiating O. C., I. M. H., Poona. Dated 14th January, 1939.

Lieutenant-Colonel B. S. Dhondy to be Officiating O. C., I. M. H., Lucknow. Dated 2nd January, 1939.

Lieutenant-Colonel J. G. McCann to be Officiating O. C., I. M. H., Shillong. Dated 18th January, 1939.

Lieutenant-Colonel H. R. Cursetji to be Officiating O. C., I. M. H., Secunderabad. Dated 24th January, 1939.

Major G. Milne is appointed to officiate as an Agency Surgeon, with effect from the afternoon of the 18th January, 1939, and is posted to the North-West Frontier Province.

Major S. D. Gupta to be Officiating Specialist in Radiology, Lucknow District. Dated 18th January, 1939.

Major M. H. Wace to be Officiating O. C., Labour Camp Hospital, Quetta. Dated 17th January, 1939.

Major A. M. Chaudhuri to be Surgical Specialist, Sialkot. Dated 7th December, 1938.

Transferred to Civil

Major G. Milne to North-West Frontier Province on 18th January, 1939.

Captain C. J. Hassett to North-West Frontier Province on 3rd January, 1939.

Captain A. B. Guild to civil U. P., on 14th January, 1939.

Captain S. Shone to civil Madras on 18th January, 1939.

Captain F. J. Doherty, D.S.O., to be O. C., I. M. H., Mardan. Dated 18th January, 1939.

Captain W. J. Virgin to be Staff Surgeon, Dehra Dun. Dated 18th January, 1939.

Captain R. J. Henderson to be Officer in charge, Brigade Laboratory, Abbottabad. Dated 28th December, 1938.

Captain B. M. Wheeler to be Officer in charge, Brigade Laboratory, Karachi. Dated 2nd January, 1939.

Captain M. H. Shah, Additional Civil Surgeon, Delhi, is appointed to officiate as Chief Medical Officer, Delhi, with effect from the 27th April, 1939, *vice* Lieutenant-Colonel R. H. Candy, C.I.E., granted leave.

Captain A. B. Guild, whose services have been placed temporarily at the disposal of the United Provinces Government for Civil employ, has been posted as Civil Surgeon, Gorakhpur.

On return from combined leave *ex-India*, from Aurangabad, Captain D. H. Waldron joined I. M. H., Quetta, on the 15th February, 1939.

Captain J. H. Gorman to Bombay Central Government as a leave reserve officer, on the 6th February, 1939.

Captain G. E. S. Stewart to be Officiating Officer in charge, I. H. C. Records, Kirkee, in addition to his normal duties. Dated 13th February, 1939.

Captain D. R. Sharma to be Officiating O. C., C. I. M. H., Mir Ali. Dated 25th February, 1939.

The undermentioned Officers reported for training at the Indian Military Hospital, Rawalpindi, on appointment to short service commissions in the I. M. S.:—

Lieutenant N. D. P. Karani.

Lieutenant Dipak Bhatia.

Lieutenant Indrajit Singh.

The undermentioned Officers reported for training at the Indian Military Hospital, Lucknow, on appointment to short service commissions in the I. M. S.:—

Lieutenant N. Jungalwalla.

Lieutenant D. D. Verma.

The undermentioned I. M. S. Officers arrived at Karachi per H. T. 'Laucashire' on 10th January, 1939, on first appointment:—

Captain O. Walker.

Lieutenant J. M. M. Drew.

Lieutenant E. L. Wilson.

Lieutenant M. D. Black.

Lieutenant H. C. Rogers.

Lieutenant J. E. Ennis.

Lieutenant I. D. Sutherland.

Lieutenant S. H. Heard.

Lieutenant H. R. Loughran.

Lieutenant J. J. Woodward.

Lieutenant G. J. H. Maud.

Lieutenant J. A. Anderson.

Lieutenant P. M. Kirkwood.

Lieutenant D. J. P. Spillane.

To be Captain (on probation)

20th December, 1938

Oliver Walker with seniority in the rank of Lieutenant (on probation) from 11th November, 1936, and as Captain (on probation) 11th November, 1937. The period 22nd October, 1937 to 29th November, 1938 (inclusive), to count for purposes of promotion and increments of pay, but not for retired pay or gratuity.

To be Lieutenants (on probation)

1st January, 1939

Cedric Culy Harvey, with seniority 1st July, 1937.
Robert John McGill, with seniority 1st July, 1937.
Lionel Edward Elkerton, with seniority 1st January, 1938.

Austen Maxwell Best, with seniority 1st January, 1938.

John Lightbody, with seniority 1st January, 1938.
Herbert Fitzroy Townsend MacFetridge, with seniority 1st January, 1938.

David Frank Eastcott, with seniority 1st July, 1938.
Harry Rees (seconded).

The undermentioned Officers are restored to the establishment:—

Lieutenant (on probation) J. A. M. Cameron, 1st January, 1939, with seniority from 1st July, 1937.

Lieutenant (on probation) L. H. Cooper, 1st January, 1939, with seniority from 1st August, 1938.

Lieutenant (on probation) W. S. Hacon is restored to the establishment, 1st January, 1939. This Officer's seniority is antedated to the 11th July, 1938.

LEAVE

Colonel A. F. Babonau, C.I.E., O.B.E., V.H.S., A.D.M.S., Deccan District, proceeded on 4 months and 28 days' combined leave *ex-India* pending retirement on 24th January, 1939.

Lieutenant-Colonel A. D. Loganadan is granted combined leave for 12 months.

Lieutenant-Colonel R. H. Candy, C.I.E., Chief Medical Officer, Delhi, is granted, with effect from the 27th April, 1939, combined leave for 4 months.

Lieutenant-Colonel R. Sen, O. C., I. M. H., Allahabad, proceeded on 9 months' combined leave *ex-India* on the 6th February, 1939.

Lieutenant-Colonel A. V. Lopes, Officer in charge, I. H. C. Records, Kirkee, proceeded on 12 months' combined leave *ex-India* on the 7th February, 1939.

Lieutenant-Colonel M. D. A. Kureishi, O. C., I. M. H., Poona, proceeded on 9 months' combined leave *ex-India* on 14th January, 1939.

Lieutenant-Colonel D. V. O'Malley, O.B.E., O. C., I. M. H., Shillong, proceeded on 12 months' combined leave *ex-India* on 18th January, 1939.

Major R. K. Tandon, O. C., Labour Camp Hospital, Quetta, proceeded on 8 months' combined leave *ex-India* on 17th January, 1939.

Major B. N. Hajra, C. I. M. H., Wana, proceeded on 8 months' combined leave in India on 25th January, 1939.

Major W. J. Shipsey, I. M. H., Shillong, proceeded on 8 months' combined leave *ex-India* on the 5th February, 1939.

Major A. J. C. Culhane, Civil Surgeon, Naini Tal, proceeded on 1 year's Medical leave from 22nd January, 1939.

Captain F. W. Whiteman, I. M. H., Alipore, proceeded on 12 months' combined leave *ex-India* on the 10th February, 1939.

Captain C. W. A. Searle, Officiating O. C., C. I. M. H., Mir Ali, proceeded on 8 months' combined leave *ex-India* on the 25th February, 1939.

Captain R. de Soldenhoff proceeded on combined leave for 8 months, with effect from the forenoon of 11th February, 1939.

PROMOTIONS

Majors to be Lieutenant-Colonels

P. N. Lahiri. Dated 28th January, 1939.

M. K. Kelavkar. Dated 18th February, 1939.

Captains to be Majors

W. Happer. Dated 2nd February, 1939.

H. T. McWilliams. Dated 4th February, 1939.

H. J. Curran. Dated 4th February, 1939.

W. P. Lappin. Dated 4th February, 1939.

B. J. Griffiths. Dated 4th February, 1939.

J. H. Gorman. Dated 4th February, 1939.

F. H. A. L. Davidson. Dated 4th February, 1939.

M. H. Shah. Dated 10th February, 1939.

Lieutenants (on probation) to be Captains (on probation)

J. W. Lillice. Dated 1st January, 1939.

E. L. Wilson. Dated 10th January, 1939, with seniority from 31st August, 1938.

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Lieutenant-Colonel F. Griffith retired on 14th January, 1939.

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might result in even more evasion than exists at present with voluntary measures.

Tuberculosis.—It is impossible to state with any accuracy how many die each year in Burma from tuberculosis as the figures as a whole are not sufficiently complete and undoubtedly many deaths from this disease are undiagnosed and unreported. From such figures as are available there is little doubt but that this disease presents a problem of ever-growing importance to the people of Burma. The history of tuberculosis shows that a heavy incidence may be expected where an agricultural population turns towards city and factory life. This factor is not present to any marked degree in Burma so it is reasonable to hope that energetic preventive and curative measures should meet with success in reducing the total morbidity and mortality from this disease. If we could achieve careful isolation and treatment of the individual case coupled with a suitable regime of home life for contacts we should have gone far towards eliminating this disease. This is axiomatic in any country but there are reasons to suggest that, though difficult or impossible to accomplish elsewhere, it could be managed in Burma.

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IMPROVEMENT in the financial condition of the province enabled Government to revert to the policy of making grants towards water-supply, drainage and sewerage schemes. Although, in the absence of any matured schemes, no part of the provision made for this purpose was actually availed of by local bodies during the year, the revival of the grants resulted in definite encouragement to local bodies to undertake sanitary engineering schemes.

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The chief engineer, public health department, reports that all the six municipal towns which have recently constructed waterworks have adopted the decentralized storage system.

In order that all works of water-supply for domestic purposes as well as all sanitary and drainage projects in the rural areas may receive the necessary amount of expert supervision, the chief engineer has been appointed inspector of local works for this purpose. All tube-well projects proposed to be financed from the Government of India grants for rural uplift were, under orders of Government, referred to the chief engineer for previous approval. After examining the schemes, the chief engineer gave suitable instructions for sinking and maintenance in each case.

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Captain J. H. Gorman to Bombay Central Government as a leave reserve officer, on the 6th February, 1939.

Captain G. E. S. Stewart to be Officiating Officer in charge, I. H. C. Records, Kirkee, in addition to his normal duties. Dated 13th February, 1939.

Captain D. R. Sharma to be Officiating O. C., C. I. M. H., Mir Ali. Dated 25th February, 1939.

The undermentioned Officers reported for training at the Indian Military Hospital, Rawalpindi, on appointment to short service commissions in the I. M. S.:—

Lieutenant N. D. P. Karani.

Lieutenant Dipak Bhatia.

Lieutenant Indrajit Singh.

The undermentioned Officers reported for training at the Indian Military Hospital, Lucknow, on appointment to short service commissions in the I. M. S.:—

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Lieutenant D. D. Verma.

The undermentioned I. M. S. Officers arrived at Karachi per H. T. 'Lancashire' on 10th January, 1939, on first appointment:—

Captain O. Walker.

Lieutenant J. M. M. Drew.

Lieutenant E. L. Wilson.

Lieutenant M. D. Black.

Lieutenant H. C. Rogers.

Lieutenant J. E. Ennis.

Lieutenant I. D. Sutherland.

Lieutenant S. H. Heard.

Lieutenant H. R. Loughran.

Lieutenant J. J. Woodward.

Lieutenant G. J. H. Maud.

Lieutenant J. A. Anderson.

Lieutenant P. M. Kirkwood.

Lieutenant D. J. P. Spillane.

To be Captain (on probation)

20th December, 1938

Oliver Walker with seniority in the rank of Lieutenant (on probation) from 11th November, 1936, and as Captain (on probation) 11th November, 1937. The period 22nd October, 1937 to 29th November, 1938 (inclusive), to count for purposes of promotion and increments of pay, but not for retired pay or gratuity.

To be Lieutenants (on probation)

1st January, 1939

Cedrie Culy Harvey, with seniority 1st July, 1937.

Robert John McGill, with seniority 1st July, 1937.

Lionel Edward Elkerton, with seniority 1st January, 1938.

Austen Maxwell Best, with seniority 1st January, 1938.

John Lightbody, with seniority 1st January, 1938.

Herbert Fitzroy Townsend MacFetridge, with seniority 1st January, 1938.

David Frank Eastcott, with seniority 1st July, 1938.

Harry Rees (seconded).

The undermentioned Officers are restored to the establishment:—

Lieutenant (on probation) J. A. M. Cameron, 1st January, 1939, with seniority from 1st July, 1937.

Lieutenant (on probation) L. H. Cooper, 1st January, 1939, with seniority from 1st August, 1938.

Lieutenant (on probation) W. S. Hacon is restored to the establishment, 1st January, 1939. This Officer's seniority is antedated to the 11th July, 1938.

LEAVE

Colonel A. F. Babonau, c.i.e., o.b.e., v.h.s., A.D.M.S., Deccan District, proceeded on 4 months and 28 days' combined leave *ex-India* pending retirement on 24th January, 1939.

Lieutenant-Colonel A. D. Loganadan is granted combined leave for 12 months.

Lieutenant-Colonel R. H. Candy, c.i.e., Chief Medical Officer, Delhi, is granted, with effect from the 27th April, 1939, combined leave for 4 months.

Lieutenant-Colonel R. Sen, O. C., I. M. H., Allahabad, proceeded on 9 months' combined leave *ex-India* on the 6th February, 1939.

Lieutenant-Colonel A. V. Lopes, Officer in charge, I. H. C. Records, Kirkee, proceeded on 12 months' combined leave *ex-India* on the 7th February, 1939.

Lieutenant-Colonel M. D. A. Kureishi, O. C., I. M. H., Poona, proceeded on 9 months' combined leave *ex-India* on 14th January, 1939.

Lieutenant-Colonel D. V. O'Malley, o.b.e., O. C., I. M. II., Shillong, proceeded on 12 months' combined leave *ex-India* on 18th January, 1939.

Major R. K. Tandon, O. C., Labour Camp Hospital, Quetta, proceeded on 8 months' combined leave *ex-India* on 17th January, 1939.

Major B. N. Hajra, C. I. M. H., Wana, proceeded on 8 months' combined leave in India on 25th January, 1939.

Major W. J. Shipsey, I. M. H., Shillong, proceeded on 8 months' combined leave *ex-India* on the 5th February, 1939.

Major A. J. C. Culhane, Civil Surgeon, Naini Tal, proceeded on 1 year's Medical leave from 22nd January, 1939.

Captain F. W. Whiteman, I. M. H., Alipore, proceeded on 12 months' combined leave *ex-India* on the 10th February, 1939.

Captain C. W. A. Searle, Officiating O. C., C. I. M. H., Mir Ali, proceeded on 8 months' combined leave *ex-India* on the 25th February, 1939.

Captain R. de Soldenhoff proceeded on combined leave for 8 months, with effect from the forenoon of 11th February, 1939.

PROMOTIONS

Majors to be Lieutenant-Colonels

P. N. Lahiri. Dated 28th January, 1939.

M. K. Kelavkar. Dated 18th February, 1939.

Captains to be Majors

W. Happer. Dated 2nd February, 1939.

H. T. McWilliams. Dated 4th February, 1939.

H. J. Curran. Dated 4th February, 1939.

W. P. Lappin. Dated 4th February, 1939.

B. J. Griffiths. Dated 4th February, 1939.

J. H. Gorman. Dated 4th February, 1939.

F. H. A. L. Davidson. Dated 4th February, 1939.

M. H. Shah. Dated 10th February, 1939.

Lieutenants (on probation) to be Captains (on probation)

J. W. Lillice. Dated 1st January, 1939.

E. L. Wilson. Dated 10th January, 1939, with seniority from 31st August, 1938.

H. C. Rogers. Dated 10th January, 1939, with seniority from 1st September, 1938.

J. M. Drew. Dated 10th January, 1939, with seniority from 1st November, 1938.

RETIREMENTS

Lieutenant-Colonel F. Griffith retired on 14th January, 1939.

Major R. D. Alexander retired on 3rd January, 1939.

RESIGNATION

Captain P. B. Cusack resigned from the service on the 10th February, 1939.

Notes

BOVRIL FOR EMERGENCIES

IN September last year, Bovril Ltd. and its associates had in England about two years' normal sales supply. At a time of crisis, however, it was obviously more difficult to cope with last-minute demands. Those, therefore, who were wise would see to it that they obtained extra supplies before a time of crisis and that they maintained these extra supplies in their store cupboards. Actually to-day the company's supplies were even larger than they were in September last year and the company was therefore capable of providing extra supplies, without dislocating normal distribution, for all those wise people who wished to have stocks of Bovril in store.

The company would endeavour to see to it that the supplies of Bovril for ordinary everyday use as a beverage, for cooking, and for use in illness or convalescence, were sufficient, and they would actually be helped in this if people who could afford to lay in supplies laid them in and maintained them as a matter of course, without waiting for an emergency to arise.

In spite of the disturbed conditions of the world's trade, the Bovril export trade showed an increase over the previous year.

The Duke of Atholl (Vice-chairman), said: The world was in a terrible state, morally, financially, and commercially, but the company's product had won right through at every point during these difficult times because it was a genuine article, it was easy to handle, it kept well, and incidentally, he supposed, it was about the greatest comfort in times of adversity. It was very gratifying to know that their product was well received all over the world.

VERITOL

VERITOL, recently placed on the market by the Knoll Chemical Works, has an energetic pressor action; it is said that in circulatory depression it effects a long-enduring restitution of the haemodynamic equilibrium. Its sphere of attack is primarily in the periphery; by redistribution of the blood pooled in the depots the amount of circulating blood is increased, but without any disadvantageous acceleration of the heart-rate, seeing that the increase in the minute volume is for the most part due to an improved cardiac output. Since the onset of the Veritol action is only gradual, no sudden extra strain is thrown on the heart. Other advantages over adrenalin claimed are the much longer duration of effect and the increased perfusion of the coronary vessels, the latter achieved without any intensification of the metabolic function. The superiority of Veritol over ephedrine lies in the fact that even repeated doses produce no deterioration of the cardiac function. It is evident that the substance also leads to some arterial constriction which does not, however, throttle functionally important circulatory sections, like that of the kidney, for instance. In contrast with other bodies of the adrenalin-ephedrine series, Veritol has been found to stimulate diuresis. The product renders valuable services in primary circulatory depression associated with a seriously lowered blood-pressure as the result of loss of blood, retention of blood in the periphery through peripheral vascular paralysis (operations, toxic damage, prolonged states of poisoning, etc.); also in depression of the vascular tonus. The reliable pressor action of oral doses of Veritol renders this form of application especially suitable for fighting protracted states of hypotonia (child-bed, convalescence).

LAROSTIDIN AND PEPTIC ULCER

DR. M. M. BENEDICT writing in the *Military Surgeon* on a study in the treatment of peptic ulcer draws the following conclusion:—

'The parenteral administration of histidine monohydrochloride in 132 cases of gastro-intestinal disorders.

112 of which were peptic ulcer, was followed by rapid remission of clinical symptoms and radiologic evidence of improvement.

Regulation of the diet and the mode of living need not be as strict as with other types of treatment, but a reasonable diet and avoidance of undue mental and physical exertion should be observed to secure the most satisfactory results from the histidine treatment.

The prompt improvement with the histidine treatment permits the patient to become ambulant early in the treatment and shortens the period of hospitalization to one month.

Patients with peptic ulcer tolerate a liberal diet, in the histidine treatment, even during the crisis.

The incidence of recurrence was reduced in cases of peptic ulcer receiving the histidine treatment, and all recurrent cases responded satisfactorily to a second treatment.

In tuberculous enterocolitis, the parenteral administration of histidine has been followed by rapid remission of diarrhoea and spastic abdominal pain. The general condition and the appetite improve.

Cases of peptic ulcer complicated by other diseases respond satisfactorily to the histidine treatment. The complicating disease should be treated at the same time.

The histidine treatment has been found of value in the treatment of gastro-intestinal ulcers other than peptic ulcer.

The parenteral administration of histidine in other diseases, particularly those of the respiratory tract, may be found of value.

The daily parenteral administration of histidine monohydrochloride has been found the therapy of choice in gastro-intestinal ulcers'.

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Original Articles

THE TREATMENT OF PNEUMONIA BY MAY AND BAKER'S 693 : REPORT ON 50 CASES WITH CONTROLS

By AMIR CHAND, F.R.C.P.E.

LIEUTENANT-COLONEL, I.M.S.

Professor of Medicine, King Edward Medical College, Lahore

G. F. TAYLOR, M.A., M.R.C.P. (Lond.), MAJOR

Professor of Clinical Medicine, King Edward Medical College, Lahore

and

NAND LALL CHITKARA, M.B., B.S.

(Working with a grant from the Punjab Government)

M. & B. 693 was first prepared in the May and Baker's laboratory in England as a result of investigation made on the large number of new compounds following the work on prontosil and sulphanilamide during the last few years. It was made in the efforts to find a chemical compound which is active against the pneumococcus. Many previous allied compounds had been made which were active against pneumococci, but were too toxic for clinical use. This new compound, labelled M. and B. 693, was finally chosen because of its high activity and low toxicity, the most satisfactory 'therapeutic ratio'.

1. Chemical composition

The formula is stated to be

$$\text{NH}_2 \text{—} \text{C}_6\text{H}_4 \text{—} \text{SO}_2 \text{—} \text{NH} \text{—} \text{C}_5\text{H}_4\text{N}$$

and has the chemical name 2-sulphanilylaminopyridine. It is a white powder, melting at 190–193°C., with a slightly bitter taste and is soluble in water to the extent of 1 part in 1,000. The amount of the drug in the body fluids can easily be estimated by a method given in May and Baker's pamphlet on the use of the drug.

2. Absorption and excretion in animals and man

Experimental work on rabbits has shown that :—

- (a) the drug is rapidly absorbed from the intestines,
- (b) that the concentration of the drug in the blood reaches its maximum at the end of the second hour,
- (c) that it drops to half this maximum concentration in the blood at the fifth hour,
- (d) that it disappears entirely from the blood after 24 hours,
- (e) that the concentration in the cerebro-spinal fluid follows closely on that in the blood.

It was upon these observations that the four-hourly administration of the drug was originally based.

The work on human beings has given results similar to those on experimental animals. Baines and Wien found that M. & B. 693 appeared in the urine 45 minutes after one gramme had been given by mouth, that 60 per cent of it was eliminated in 24 hours and that it was completely eliminated in 50 hours. The concentration in the blood of human beings is at its maximum five hours after it is being given by the mouth.

Hobson reports the blood concentration in a male adult volunteer who received by mouth six doses of 1 gramme of M. & B. 693 at intervals of two hours. The maximum concentration of 10 mgm. per 100 c.cm. in the blood was reached between the third and fourth hour and was maintained for 24 hours, after which it quickly dropped to zero within the next 12 hours. This shows that doses repeated at short intervals will maintain a high concentration in the blood and also in the cerebro-spinal fluid.

3. Activity in experimental infections

The discovery of the activity of M. & B. 693 in experimental infections was made by Whitby (1938). Work had previously been done since 1935 on the action of various sulphonamide derivatives on pneumococci in Germany, France and England, which had shown that these compounds had some inhibitory action on pneumococci. Whitby worked on mice giving them M. & B. 693 by mouth by means of a stomach tube. He concluded that 'M. & B. 693 protects the mouse effectively against 10,000 lethal doses of pneumococcus type I and affords considerable protection against 10,000 lethal doses of other types of pneumococci'. He also showed that it was as effective as sulphanilamide against hæmolytic streptococcal and meningococcal infections.

Fleming (1938) working at St. Mary's Hospital, London, with delucocytised blood and defibrinated blood which had not been deprived of its leucocytes, showed that it is not bacteriocidal without leucocytes, but is strongly bacteriostatic, while with leucocytes it enhances enormously the anti-bacterial power of the blood, both to hæmolytic streptococci and pneumococci. He concluded that the increased anti-bacterial power lies in the serum. M. & B. 693 does not prevent encapsulation of the pneumococci. He describes methods for estimating the anti-bacterial power of the serum.

4. Clinical trials

The report of the first clinical trial of M. & B. 693 was made by Evans and Gaisford (1938) from Birmingham. They treated 100 cases of pneumonia with the drug and compared the results with 100 cases who were in the wards of their colleagues at the same time and were treated on ordinary lines without serum or

M. & B. 693. Of the 100 patients treated with M. & B. 693, 8 only died, while in the 100 control cases there was a mortality of 27 per cent. The 27 per cent mortality corresponded to the usual mortality of cases in Birmingham at that time of the year. They noted that the drug caused a dramatic fall in temperature in the first 24 hours in 37 per cent of the cases, and in a further 23 per cent in the next 24 hours. No case of granulopænia was noted. Of the complications, they noted a higher number of empyemas in the treated cases, there being 6 in the treated and only 1 in the controls. The usual number of empyemas in pneumonia is given by Osler as 2 to 3 per cent. No conclusion was reached as to influence on various types, but work is being done on this in Birmingham and has not been reported as yet.

The drug has been given an extensive trial in the mines of Johannesburg, where it is reported that no native had died of pneumonia in the mines for the last three months. Exact details of this report have not as yet been obtained by us.

5. Use in pneumococcal meningitis and gonorrhœa

There are reports of recovery of two cases of pneumococcal meningitis treated with M. & B. 693 (Reid and Dyke, 1938, and Robertson, 1938). Price (1937) stated that 'No cases of recovery from this form of meningitis has hitherto been recorded'.

It has been used also in gonorrhœa. Prebble (1938) reported the trial of M. & B. 693 in 65 cases of acute gonorrhœa and concluded that it is the most active of the chemotherapeutic substances combined with a low toxicity, in this disease.

controls; both lobar and broncho-pneumonia were included. With a few exceptions cases have been treated alternately with M. & B. 693 and by ordinary means, but in 2 or 3 cases strict alternation of cases has not been followed, M. & B. 693 being given to the more serious cases.

The dose was according to the plan worked out by Gaisford and Evans in Birmingham and recommended by May and Baker, namely, 4 tablets each of 0.5 gram on admission, repeated 4 hours later, a further 2 tablets 4 hourly for 36 hours, followed by 1 tablet 4 hourly for a further 36 hours. The plan of doses was interfered with, in some cases, by vomiting. In some cases the drug was not given if the patient was asleep.

Of the 50 cases treated with the drug, 5 cases died giving a mortality of 10 per cent. Of the control cases there were 9 deaths, i.e., a mortality of 18 per cent.

Eleven cases of pneumonia came to the hospital during this period in a moribund condition and died within the first 24 hours in hospital and have not been included, either in the control or treated lists of cases.

In the 50 treated cases, 2 deaths occurred in 24 cases who came to the hospital during the first five days of the pneumonia, i.e., a mortality of 8.5 per cent, and 3 deaths occurred in 26 cases who came on the fifth day or after, i.e., a mortality of 11.5 per cent.

In the control group 16 cases came to the hospital during the first five days of whom 1 died, a mortality of 6.25 per cent, while 34 cases came on the fifth day or after of whom 8 died, a mortality of 23.75 per cent.

These figures are set out in the following table :—

	Total	Total deaths	Total treated before five days	Death	Total treated on fifth day or after	Death
M. & B. 693	50	5 or 10 per cent *	24	2 or 8.5 per cent.	26	3 or 11.5 per cent.
CONTROLS ..	50	9 or 18 per cent *	16	1 or 6.25 per cent.	34	8 or 23.75 per cent.

* This difference is far from 'significant' statistically, and, in an infinite number of experiments, in which two groups of patients were treated by exactly the same method, this—or a greater difference—would be observed once in every three times.

On the other hand, the differences which these writers show in the time of fall of temperature in the two groups is 'very significant', statistically.—EDITOR, *I. M. G.*

6. Report of the trial in the Mayo Hospital, Lahore

During the last two months, December 1938 and January 1939, 50 cases of pneumococcal pneumonia have been treated in the Mayo Hospital, Lahore, with M. & B. 693 and 50 kept as

The most striking result of M. & B. 693 treatment is that the temperature comes down to normal within 24 or 48 hours of giving the drug. This was noted by Gaisford and Evans and was obvious in this Lahore group. In 39 cases of the treated group, the temperature fell to normal

in 48 hours, i.e., in 78 per cent of the treated cases. In the control group however only 1 case of the 50 had a normal temperature within 48 hours of admission to hospital. In 28 of the 50 treated cases the temperature was normal on or before the sixth day while in only 3 out of the 50 'controls' was the temperature normal as the result of normal crisis on or before the sixth day of disease.

This is shown also by the following table :—

	Total cases	Average days of temperature in hospital	Average stay in hospital
M. & B. 693	50	2.7	9.9
CONTROLS ..	50	5.96	13.8

8. Complications

Vomiting.—This occurred in 16 cases of the treated group and is apparently due to the action of the drug on the stomach. A supply of the drug suitable for injection has been obtained and will be used in future for those who vomit. As yet no experience of these injections is available.

Leucopenia.—This was noted in one case. White blood cell counts were done in all cases at intervals. In one case treated with M. & B. 693 the white cells fell from 25,000 to 12,000 during treatment, but there were no adverse clinical signs. The patient made an uninterrupted recovery.

Vomiting was the only complication of any importance noted though the following complications are recorded by other workers: headache, nausea, breathlessness, dizziness, lassitude, general malaise, drug rash and fever, cyanosis and methæmoglobinæmia.

Unresolved pneumonia.—This was noted in 3 cases treated with 693 and in 3 of the controls.

Empyema.—This has occurred in 2 treated cases one of whom is not included in this group as he is still in the hospital, while none occurred in the controls. This agrees with the findings of the Birmingham workers that empyema is commoner in cases treated with M. & B. 693. In these two cases the empyema has been aspirated by a syringe and needle and the cases treated with M. & B. 693 without operation. They are progressing satisfactorily and it appears that operation will not be necessary. One has been discharged as cured.

Further experience is needed before coming to any conclusions as to the value of the drug in pneumococcal empyema.

An enlarged spleen due to previous malarial infection was noted in 6 of the M. & B. 693 cases and in 3 'controls' and received appropriate treatment.

In many of the M. & B. 693 treated cases the sputum remained blood stained when the temperature came to normal. Clinically, there was

no obvious sign that resolution took place in an abnormal way or at an earlier or later period than in the untreated cases.

Retention of urine was noted in 2 cases.

Subnormal temperature was noted in 2 cases after treatment was completed.

Owing to delay in obtaining type sera from America, the typing of pneumococci has only been done during the last few weeks. It is proposed to type all future cases and to obtain information as to the relation of the type of pneumococcus to the therapeutics of the drug.

The Punjab Government has given a grant for anti-pneumococcal Felton's serum. This will be tried in pneumonia with and without M. & B. 693 in the Mayo Hospital during the next year in order to assess the value of serum treatment.

During this period 4 cases of pneumococcal meningitis following pneumonia were admitted and treated with full doses of M. & B. 693—all died. Recently a case of primary pneumococcal meningitis has been treated with M. & B. 693 outside the hospital and he has recovered completely without any complication.

Summary and Conclusions

From the above the following conclusions are drawn :—

The mortality is greatly reduced by the use of the drug in this series of cases—from 18 per cent in untreated cases to 10 per cent in the treated.

By the use of M. & B. 693 the days of raised temperature in hospital are greatly reduced, from an average of 5.96 days in the controls to 2.7 days in the treated.

The stay in hospital is reduced on the average by four days. Most cases were kept in the hospital until signs of resolution were complete. Some cases in both groups left against medical advice.

It is obvious that for statistical purposes these figures are too small in number to draw final conclusions, but, taken with other published results, they indicate the value of this new drug.

Vomiting was the only complication of any importance noted and it occurred in 32 of the M. & B. 693 treated cases. There appears to be no serious toxic action of the drug.

Both from the clinical day-to-day study of these cases and from a study of the cases reported elsewhere, we think there is convincing evidence that M. & B. 693 should be given to all cases of pneumococcal pneumonia as the routine treatment until a better drug be made available. Further evidence as to its value will accumulate rapidly. Knowledge of the use of concentrated anti-pneumococcal serum used with M. & B. 693 will be available within the next year or two. But it is unlikely that serum will come into general use in pneumonia because of its expense.

(Continued at foot of next page)

CLINICAL OBSERVATIONS ON PNEUMONIA OCCURRING IN A TEA-GARDEN IN ASSAM

By SAILESH CHANDRA DUTTA, L.M.P.

Assistant Medical Officer, Itakhooli Tea Estate,
Tinsukia, Assam

THE literature dealing with pneumonia is already voluminous, but surprisingly uninformed regarding the clinical types found in Assam. I therefore feel that no apology for the present observations is needed. Bhattacharyya (1936) reviewing 233 cases of pneumonia occurring in an estate near Doom Dooma found that 'atypical clinical pictures were more common than the classical pictures of textbooks'. The present communication deals with 102 consecutive cases observed from January 1937 to June 1938 and is an attempt to assess the importance of certain factors in ætiology and prognosis, to describe the clinical picture, and to assess the value of different modes of treatment.

Population.—The population of the garden is about 2,400. The majority being new recruits, are unacclimatized. Addiction to alcohol is a common habit.

Climate.—The climate is hot and moist in summer, cold and dry in winter. The maximum temperature in summer is a little below 100°F. and the minimum temperature in winter goes down to about 48°F. During the months from March to October the minimum temperature is above 60°F. The maximum range of diurnal variation is during the change of seasons, but in summer also weather is very changeable. Rain-fall is heavy during June, July and August. Heavy showers of rain alternating with hot sunshine are the characteristic features of weather during these months.

Age and sex.—Incidence by age and sex has been summarized in table I. Both sexes were almost equally affected in children, and males slightly predominated after ten years onwards. In labouring-class people, females are equally

TABLE I

Sex	AGE GROUP IN YEARS								Total
	Under 1	1-5	6-10	11-20	21-30	31-40	41-50	51-60	
Male ..	6	12	4	4	7	15	4	3	55
Female ..	4	16	4	6	10	6	1	Nil	47
TOTAL ..	10	28	8	10	17	21	5	3	102

INCIDENCE

The following factors affecting incidence will be considered—population, climate, age, sex and time of year.

(Continued from previous page)

This group of cases is small but they are collected to confirm for Indian patients the work done in England and elsewhere and to bring to the notice of medical practitioners the value of this new drug.

Acknowledgment.—I wish to thank Rai Bahadur Jiwan Lal for his collaboration, Dr. Mohd. Yusuf for his very helpful criticism, May and Baker for supplying some of the M. & B. 693 used and Mrs. Bharucha for supplying funds to buy the remainder.

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subject to exposure, in pursuance of their duty and household work, as their male companions. No age was exempt, but the highest incidence was found in the first and fourth decades.

Time of year.—Incidence by months has been shown in table II. It is interesting to note that the heaviest incidence is during the summer months, suggesting that the wearing of wet

TABLE II

Number of pneumonia cases

Months	1936	1937	1938	Total	Percentage
January ..	1	1	..	2	1.4
February ..	..	5	3	8	5.6
March ..	1	5	5	11	7.6
April ..	4	6	5	15	10.5
May ..	2	4	16	22	15.4
June ..	7	5	21	33	23.1
July ..	5	6	5	16	11.2
August ..	1	8	..	9	6.3
September ..	2	5	1	8	5.6
October ..	2	1	2	5	3.5
November ..	1	3	5	9	6.3
December ..	..	3	2	5	3.5
TOTAL ..	26	52	65	143	100.0

clothing (which is unavoidable) is of more importance than atmospheric temperature.

CLINICAL PICTURE

In this series there were 57 cases of lobar and 45 cases of broncho-pneumonia. Among the lobar cases were seven secondary to influenza. There were four central cases, one abortiform case and one case in a lunatic. Both the lungs were affected in only two cases. No apical type was found.

It is my confirmed opinion that most of the cases found in this part of India are atypical and do not follow the textbook type. This observation corresponds with that of Bhattacharyya (*loc. cit.*). It is particularly difficult to diagnose a case at the beginning and still more difficult to differentiate lobar cases from broncho-pneumonia and influenzal types.

Lobar pneumonia.—Onset of the disease is gradual with low temperature, generalized pain in the body and a little or no cough. Then gradually the temperature rises, pain becomes localized, dyspnoea begins and there is harassing cough with or without a little mucoid expectoration. Sudden onset with high temperature, dyspnoea, rigor and acute pain in chest is rare. The pyrexia may be continuous or irregularly remittent. It lasts as a rule for two or three days and finally remits by crisis. The patient feels almost well. There are no dyspnoea, no pain in chest, cough is productive and pulse rate is within normal limits. In other cases the pyrexia does not remit or, after the characteristic remission, the temperature may rise sharply again and remain continuously high. The dyspnoea is marked with varying degree of toxæmia and the patient is in acute distress. Delirium is a common accompaniment. The sputum is rusty now. The temperature ultimately comes down by lysis in the majority of these cases. Pulse and respiration rate gradually return to normal limits, cough is purulent and productive. I have found that pulse-respiration ratio in lobar cases varies between 3 to 1 and 2 to 1. Bradycardia is found during convalescence in many cases in which the temperature comes down by crisis. Pulmonary signs of the disease may be completely absent for the first two or three days; but generally fine crepitations or friction sounds are found. In cases where temperature comes down within two or three days, no dull area is discoverable at all. After crisis moist sounds persist only for two or three days.

In cases where pyrexia persists for a longer period, a dull area is found rather late, on the fourth or fifth day. The extent of the lesion does not seem to have any relation to lobar limitations. In some cases only a small portion of one lobe is affected and the lesion does not increase. In others the consolidation extends from one lobe to another. No selective affinity for the right base is found. Breath sounds are generally harsh, but are inaudible when pleural

involvement is marked. Typical tubular breathing is rarely found. After cessation of pyrexia, redux crepitations and bubbling râles persist for a long period.

Broncho-pneumonia.—These cases are still more atypical in their mode of onset and subsequent course. Admission with moderate pyrexia, loose sputum, running from eyes and nose, a haggard look, and irritable temper is the rule. Many are admitted with gastrointestinal symptoms, *e.g.*, vomiting and diarrhoea. Convulsions and signs of cerebral irritation are rare. Dyspnoea is marked and pulse rate is very high. Generally the pulse respiration ratio is 2 to 1 or less. The temperature chart is very variable. The pyrexia may be intermittent, remittent or continuous or an irregular combination of all. Sudden change of temperature to intermittent character is also common. In long-standing cases, the temperature settles down by lysis and in favourable early cases by crisis.

The physical signs are also variable. Almost all the cases are admitted with bubbling râles scattered in both lungs. In the majority of cases, however, after a day or two, crepitations and rhonchi are found in limited patchy areas. Consolidation is rarely found although pyrexia may persist for a long period with severe toxæmia and cyanosis. Breath sounds are loud and harsh and constantly changeable. Cough is non-productive except when the child vomits. Adventitious sounds in lungs persist for a long time after cessation of pyrexia. Considering the mode of onset, course of temperature and pulmonary signs, I would like to call these cases 'influenzal'. Typical primary broncho-pneumonia is rare.

PROGNOSIS

The outcome of the disease may be affected by the attitude of the patient, the existence of concurrent disease and the severity of the pneumonic process. Among tea-garden labourers especially, prognosis can be so gravely influenced by the patient's attitude that I propose to enumerate the dangers rather more fully.

Posture.—Complete rest in a patient is difficult to secure. He will suddenly get up from bed, for no apparent reason or to pass excreta. He seldom uses the bed-pan or takes nourishment in a lying posture. This behaviour seriously affects prognosis. Sudden collapse without any warning sign is mainly attributable to this cause.

Refusal of treatment.—The patient will sometimes resist some of the general measures to be undertaken, *e.g.*, warm bandage on chest, cold douching on head, sponging of the body and the giving of enemata. To manage such a case is a matter of tactfulness and the maintenance of a convincing attitude by the attending physician.

Diet.—Rice is the main item of the dietary of these people and they think that in disease

too this is the only thing that maintains strength. It is a common occurrence at night for some of the patient's relatives to come in with a small dish of rice and fowl curry; the patient takes it and is attacked with obstinate tympanites next morning.

Late admission to hospital.—This is unfortunately a characteristic of labouring-class communities throughout the world.

Excessive alcoholism.—Virtually all coolies who are old enough to take alcoholic liquor do so to excess.

Concurrent disease.—Pneumonia in a malarial or anæmic subject is common here. In my experience, anæmia makes for a bad prognosis, malaria does not.

Severity of the pneumonic process.—Signs of bad augury are as follows:—

(a) Severe dyspnoea and cyanosis, (b) anorexia, (c) obstinate insomnia, (d) obstinate tympanites, (e) muttering delirium, and (f) irregular pulse.

Complications and sequelæ

In this series serious complications were rare. The following were the complications found:—

(a) Violent delirium	1 case
(b) Venous thrombosis of both legs	1 "
(c) Œdema of lower extremities ..	9 cases
(d) Otitis	3 "

Most of the cases, being repatriated to their country, could not be followed. One patient of this series expired from an attack of bacillary dysentery afterwards.

Treatment

The treatment of pneumonia remains a difficult problem still. Immediately any departure is made from the sheet anchor of complete rest and good nursing, we enter into the realms of controversy. Many drugs have betrayed the too-trusting physicians and even regarding the use of digitalis, alcohol, oxygen, and local applications, there is no unanimity of opinion. Specific serum has been successful against types I and II but appears to be of little value against other types. Moreover, Napier and Dharmendra (1935) claim that types I and II are very rare in Assam and that only sera prepared against the types normally found in Assam are likely to be of much value.

A number of non-specific protein compounds and antigenic preparations have been introduced for the treatment of the acute infections and have received favourable mention by clinical workers after more or less extensive trial in cases of pneumonia. Potassium iodide is a remedy of ancient lineage and intravenous injections of iodine have been, and are, popular with other workers.

The scheme of treatment, I personally use in my hospital for cases of pneumonia, is as follows:—

(1) Complete rest in bed, and taking nourishment and passing excreta in the lying posture, is insisted on.

(2) The patient is covered with light blankets and kept near an open window.

(3) The chest is wrapped with a layer of cotton wool and loosely bandaged.

(4) Cold douching to the head at noon daily.

(5) Liniment camphor ammoniata mixed with equal parts of mustard oil applied locally.

(6) Plenty of glucose drink (20 per cent with sodium bicarbonate a drachm to a pint) is supplied.

(7) Sago, barley water, milk and weak tea form the main dietary.

(8) *Expectorants*.—In adults for the first two days alkaline mixture containing potassium citrate, sodium bicarbonate and tincture scillæ is given and is replaced, on the third day, by a mixture containing potassium iodide, creosote, aromatic spirits of ammonia and tincture senega. When the sputum is loose, ordinary stimulant mixture containing aromatic spirits of ammonia, spiritus ætheris sulphuricum and compound tincture of cardamom is substituted.

In children.—For the first two days, the alkaline mixture as in adults with compound tincture of camphor, if necessary, is used. From the third day, a mixture containing Thiocol, aromatic spirits of ammonia, tincture ipecacuanhæ and extract glycyrrhiza liquid is found most useful.

(9) In addition to the general treatment outlined above, every case is treated with one of the following: Intravenous iodine, S. U. P. 36 and Omnadin.

(10) *Emergency measures*.—

(a) Cardiac failure—in my experience digitalis from the beginning has no special advantage. In emergency, Tincture digitalis mxx—thrice daily and subcutaneous injection of strychnine and digitalin combined have been found useful.

(b) Tympanites—turpentine stupe to the abdomen and pituitrin injection.

(c) Sleeplessness—paraldehyde two drachms at night. If insomnia is mainly due to cardiac embarrassment, an injection of digitalin and strychnine is given in addition to the paraldehyde.

(d) Violent delirium—hyoscine hydrobromide has been found quite useful.

(e) Spasmodic cough—steam inhalation from bronchitis kettle with compound tincture of benzoin a drachm to a pint, in the water, ensures rest and relief to the children with spasmodic cough or with dry cough in the early stage of the disease.

When intravenous iodine is used in treatment, the technique adopted in this hospital

is as follows : For one injection, $\frac{1}{2}$ gr. of pure iodine is dissolved in 10 c.cm. of sterile distilled water containing 1 gr. of potassium iodide. The injection is given slowly into a vein and caution exercised so that no solution escapes in the subcutaneous tissue. An indurated swelling of the part may appear from the irritating solution going outside the vein. But this never suppurates and is successfully treated with 50 per cent methylated spirit compress and glucose drink.

There seems to be no contra-indication except tuberculosis. No bad effect was found immediately after injection except in one patient who complained of faintness and had a rigor after injection. It was a hot summer day and he soon recovered with general measures. No remote bad effect or signs of intolerance were found even after one daily injection on four consecutive days. Intravenous iodine therapy has obvious disadvantages in the treatment of children.

Of the 102 cases in this series, one was of abortiform type, the fever remitting on the second day; one was a terminal case and two cases were admitted very late in a precarious condition and expired within twenty-four hours. These cases were treated on general lines only and will not be considered further.

Thirty cases were treated with intravenous iodine, 29 cases with S. U. P. 36, 23 cases with omnadin, and 16 cases with different combinations of the above three.

Combined treatment was generally given in resistant cases when one or other alone failed to control the disease in a reasonable period. This group is, therefore, not strictly comparable with the other three.

No control cases were kept, as previous experience on this estate had given me the impression that these additional forms of treatment resulted in more rapid discharge of patients and the exigencies of service prevented the adoption of a purely experimental attitude.

The results of treatment are summarized in the following tables.

Table III shows the average number of injections required for each case. No more than four consecutive injections of iodine or omnadin and no more than three injections of S. U. P. 36 were given in any one case.

TABLE III

Treatment	Number of cases	Average number of injections in each case
Iodine ..	30	2.6
S. U. P. 36 ..	29	2.0
Omnadin ..	23	2.4
Combined ..	16	4.7
TOTAL ..	98	2.7

Table IV shows that the average days of pyrexia in each case was seven. The maximum period of pyrexia in lobar cases was 19 days; and in broncho-pneumonia cases 29 days.

TABLE IV

Treatment	Number of cases	Average days of pyrexia in each case
Iodine ..	30	5.4
S. U. P. 36 ..	29	5.4
Omnadin ..	23	6.2
Combined ..	16	13.2
TOTAL ..	98	6.9

Temperature came down by crisis in 44 cases out of 88; one abortiform case and 13 fatal cases being excluded. Table V shows that the highest percentage of crisis cases was in the iodine-treated series.

TABLE V

Treatment	Number of cases	Crisis case	Percentage
Iodine ..	29	19	65.5
S. U. P. 36 ..	25	12	48.0
Omnadin ..	22	11	50.0
Combined ..	12	2	16.6
TOTAL ..	88	44	50.0

Table VI demonstrates the mortality in each mode of treatment. Here the cases are divided into three groups according to the day of admission. Admission on the first day of disease was considered to be early, on the second and third days to be moderately early and from the fourth day onwards, to be late.

The mortality in iodine-treated cases was 3.3 per cent. There was no fatality in early or moderately early cases, and in late cases too it proved useful.

Omnadin was almost equally effective in early and moderately early cases but less effective than iodine in late cases.

S. U. P. 36 proved useful in early cases, less so in moderately early cases and practically of no use in late cases.

In the 'combined treatment' group the mortality was 25 per cent. As shown in table IV these were the most resistant cases.

The gross mortality in my series was 12.7 per cent. Here, I must mention that every pneumonia case occurring in the garden during this period of observation was brought into the hospital.

The paramount importance of early admission to the hospital is also clear from table VI.

TABLE VI

Treatment	EARLY			MODERATELY EARLY			LATE			TOTAL		
	Cases	Death	Per-centage	Cases	Death	Per-centage	Cases	Death	Per-centage	Cases	Death	Per-centage
Iodine	12	Nil	..	11	Nil	..	7	1	14.3	30	1	3.3
S. U. P. 36	13	Nil	..	11	1	9.1	5	3	60.0	29	4	13.8
Omnadin	8	Nil	..	11	Nil	..	4	1	25.0	23	1	4.3
Combined	3	Nil	..	6	4	66.6	7	Nil	..	16	4	25.0
No special	2	1	50.0	Nil	..	..	2	2	100.0	4	3	75.0
TOTAL	38	1	2.6	39	5	12.8	25	7	28.0	102	13	12.7

In early cases the mortality rate was only 2.6 per cent and the prognosis worsened according as the cases were admitted later in the disease.

Table VII shows the mortality by age. There was no death in the age group six to ten years. This is an interesting but generally recognized finding. It is evident that the prognosis is worse after forty years of age.

TABLE VII

Age groups in years	Number of cases	Death	Percentage
Under 1	10	1	10.0
1 to 5	28	4	14.3
6 to 10	8	Nil	..
11 to 20	10	1	10.0
21 to 30	17	2	11.8
31 to 40	21	3	14.3
41 to 50	5	1	20.0
51 to 60	3	1	33.3
TOTAL	102	13	12.7

Table VIII shows that the mortality rate differs a little in the two types*.

TABLE VIII

Type	Number of cases	Death	Percentage
Lobar	57	8	14.0
Broncho.	45	5	11.1
TOTAL	102	13	12.7

Conclusion

It is evident that the pneumonia cases found on this estate do not follow the classical types

* This difference is far below the 'significance' level statistically.—EDITOR, I. M. G.

in their incidence and clinical picture. It is logical to think that their bacteriology and pneumococcal typing will also differ.

Compared with S. U. P. 36 and omnadin, intravenous iodine has proved most useful in the treatment of pneumonia. It is a very cheap treatment and deserves extensive clinical trial.

Summary

(1) The clinical aspects of 102 consecutive cases of pneumonia occurring on a tea garden in Assam are discussed.

(2) The sexes are found to be equally susceptible and no age is exempt. The heaviest incidence occurs in the first and fourth decades of life and during the wet summer months.

(3) The clinical picture, as a rule, is atypical.

(4) Omnadin, S. U. P. 36 and intravenous iodine have been extensively tried and their results compared. The technique of intravenous iodine is discussed.

(5) Prognosis is not affected by the type of pneumonia. It is worst in patients over forty years of age and in cases admitted to hospital late in the disease.

Acknowledgment

My thanks are due to my chief Dr. K. P. Hare, to whom I owe a deep debt of gratitude for encouragement and valuable help in the preparation of this paper.

My thanks are also due to Mr. F. O'Connor, the manager of the garden, for his kind permission to publish this paper.

My thanks are also due to Sjt. K. C. Handique and my hospital assistant, Babu A. C. Das, for necessary help.

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LECITHIN AND GLUCOSE IN THE TREATMENT OF THE OPIUM HABIT

By S. C. GUHA ROY, L.M.S.

Assistant Medical Officer, Borbhecl Tea Company, Limited, Borgang P. O., Assam

Our attention having been drawn to the treatment of the opium habit by lecithin and glucose by a paper in this journal by Chopra and Chopra (1937), we decided to treat the opium addicts living on this garden. There were 96 opium addicts amongst the garden labourers, who had emigrated mainly from the Cuttack district and had been settled here for many years. The opium habit has lowered them both morally and physically, and turned them into a group of lower-grade labourers. The manager, Mr. F. T. H. Hearn, has taken great interest in the treatment, and with his help and encouragement we have treated 38 cases with the most encouraging results. The remaining addicts, except those who are physically unfit, will be also taken in hand.

The following tables will show the cases treated :—

Sex and age of addicts

Ages	Male	Female	Total
15-20 years ..	1	1	2
21-30 " ..	8	4	12
31-40 " ..	8	5	13
41-50 " ..	7	1	8
51-60 " ..	2	1	3
TOTAL ..	26	12	38

Duration of habit in years

Duration	Number of addicts
3-10 years ..	10
11-20 " ..	23
21-31 " ..	5

Daily ration of opium in grains

Daily ration	Number of addicts
4-10 grains ..	21
11-15 " ..	10
16-20 " ..	6
21-25 " ..	1

Process of taking opium

Process	Number of addicts
Smoking	17
Eating	14
Combined smoking and eating	7

Treatment.—Addicts were taken as indoor sick in batches of six, and received the same daily wage that they would have earned on the garden. After a preliminary examination the selected cases handed over their opium licences, which were sent back to Government, and their ration was abruptly stopped. Usually they were admitted in the morning, after taking their morning dose of the drug and the treatment commenced with ovo-lecithin in pills of gr. 10 thrice a day and glucose water (1 in 6) *ad lib.* for the first five or six days. The first night calomel was given and was followed by a free dose of magnesium sulphate next morning. We could not examine the urine to detect morphia, but we were satisfied that the report of our watchman and of the other patients, that opium was not being taken, was correct. The first batch was selected from volunteers and the success with this batch encouraged the other addicts to think that the opium habit could be given up. Realizing the amount of money they would save through abandoning the habit, as contraband opium is said to be sold at Rs. 6 per tola, there was considerable competition to be chosen for the next batch. Even very old and physically unfit people requested to be treated. We noticed that the will-power of the addicts played a good part in the treatment.

Symptoms varied considerably according to the accustomed dose, duration of habit and general health. During the first 24 hours, patients complained of general discomfort which turned worse at the times at which they had been accustomed to take the drug. Muscular pain all over the body, specially in the limbs, and often severe cramp in calf muscles were typical symptoms.

Insomnia added to their general discomfort. This condition continued for three to five days and then gradually lessened until the tenth to fifteenth day, after which the symptoms disappeared. They were treated with massage, aspirin, bromide, hyoscine hydrobromide, paraldehyde and medinal.

Other symptoms noted were epigastric pain, hiccough and running from nose and eyes. Some complained of mild nausea, vomiting, diarrhoea or constipation. For these the usual treatment was given.

For the first few days their appetite remained very poor and they were given *dohi*, *chirra* and *soojee*, but it improved gradually on a soda and gentian mixture and they were put on the usual hospital full diet. General weakness needed care afterwards with tonic. The majority of patients shook off the symptoms after two weeks, but were detained another week in hospital to recoup their general health. They told us after the first week that they lost all desire for opium. Most of them were markedly improved in general health at the time of discharge.

(Continued at foot of next page)

A SIMPLE AND INEXPENSIVE METHOD OF INTRA-TRACHEAL ANÆSTHESIA

By M. C. GANGULI, M.B. (Cal.), D.A. (Eng.)
Anæsthetist, Medical College Hospitals, Calcutta

PROBABLY a few lines as a plea for the more extensive use of intra-tracheal anæsthesia in this country, especially for operations on the mouth, face, head and neck, will not be deemed out of place.

Though operations on these parts can be performed by some form of rectal anæsthesia—avertin or ether-oil, or intra-pharyngeal methods, in each case the anæsthetist has to maintain an efficient airway by manipulations of the jaw, not without some inconvenience to the surgeon and risk of infection of the wound from his hands, even though gloved. Moreover, during operations within the mouth the surgeon and his

(Continued from previous page)

Short notes on three cases are given below :—

Case 1.—A male, aged 48 years, taking raw opium, 18 grs. daily in three doses for about 18 years.

Cramps in calf muscles remained very bad for about three weeks.

Case 2.—A male, aged 50 years, smoking 18 grs. of opium daily in three doses for about 25 years.

On the third night of treatment he was on the verge of collapse with profuse perspiration and feeble pulse but reacted soon to stimulants. Insomnia and general debility were very troublesome with him. He is a garden sirdar, and is now working well and of better physique than before.

Case 3.—A male, aged 60 years, taking raw opium, 12 grs. daily in two doses for about 30 years. He is old with all signs of senile decay. Against our advice he volunteered to undergo the treatment and patiently endured a great deal of discomfort. He has now given up opium for one and a half months, but suffers from general debility and occasional pain in the abdomen.

Four addicts gave up the habit without hospital treatment. They cut the dose gradually and took to drink instead—the lesser of two evils! More are following in their footsteps. The treated cases are under observation and as far as we know they have not gone back to opium and most of them are markedly improved in health.

I must finish by thanking the chief medical officers, J. R. Robertson and H. H. Davies, for their kind advice and encouragement.

Summary

1. Thirty-eight cases of opium addicts were treated in a tea-garden hospital with cent per cent success.

2. With the co-operation of the addict the treatment was easier than had been expected.

REFERENCE

Chopra, R. N., and Chopra, G. S. (1937). *Indian Med. Gaz.*, Vol. LXXII, p. 265.

assistants have to be always on the alert to prevent any aspiration of blood within the air passages. The intra-tracheal catheter, maintaining as it does an automatic and efficient airway in any position of the head and neck and an intra-pharyngeal plug preventing any chance of entry of blood into the trachea, a sense of security is given both to the surgeon and the anæsthetist, which neither will like to forego.

But a great drawback of intra-tracheal anæsthesia lies in the rather expensive and complicated machines which are necessary and which unfortunately few of our hospitals in India can afford to possess. For some time the writer has been using a very simple method requiring but a few appliances, the cost of which is within the financial capacity of most hospitals*.

The technique has so far worked quite satisfactorily and the details are given below (figure 1).

The patient having been anæsthetized with chloroform-ether sequence an intra-tracheal catheter (c) of adequate bore is introduced into the trachea under a direct-vision laryngoscope in the usual way and the pharynx plugged with moist rolled gauze. A dental prop or gag placed in position prevents the catheter from being bitten. The projecting part of the catheter is now strapped to the forehead with adhesive plaster and its end fixed to a rubber tube about three inches long which is connected to one limb of a metal Y tube (e). Another limb of this Y tube is connected to a biggish glass funnel covered with a double layer of lint by rubber tubing about a foot and a half long. If the opening in the third limb of the Y tube is now closed, either with a finger or with a cotton-wool plug (d), the lint on the funnel will be seen to move up *a* and down *b* with each act of expiration and inspiration. The funnel is placed on its side on a table and ether dropped on the surface of the lint. A few drops of chloroform are sometimes of advantage during the early stages. The funnel should not be held erect as liquid ether may be aspirated into the trachea with disastrous consequences in case an undue excess is poured on the lint. This danger can however be avoided by using a glass or copper can with an open top and a spout fixed near to

*The approximate cost of the appliances required is about Rs. 90 as below.

	Rs.
A laryngoscope with flexible wire and dry cell	65
(Magill's type has the battery fixed within the handle.)	
$\frac{1}{2}$ dozen intra-tracheal catheters ..	20
Funnel, rubber tubing, and Y tube ..	5
TOTAL ..	90 only

The cost can however be reduced to a minimum of about Rs. 20 only if pernasal blind intubation is resorted to with Magill's tube, but failure in about 30 per cent of cases is to be expected.

the top in place of the funnel (figure 2). The open top can be covered with lint and any excess on it will settle at the bottom of the can without

Thanks are due to Mr. D. C. Chakravarty, M.B.D., F.R.C.S., Professor of Clinical and Operative Surgery, Medical College, Calcutta, for his

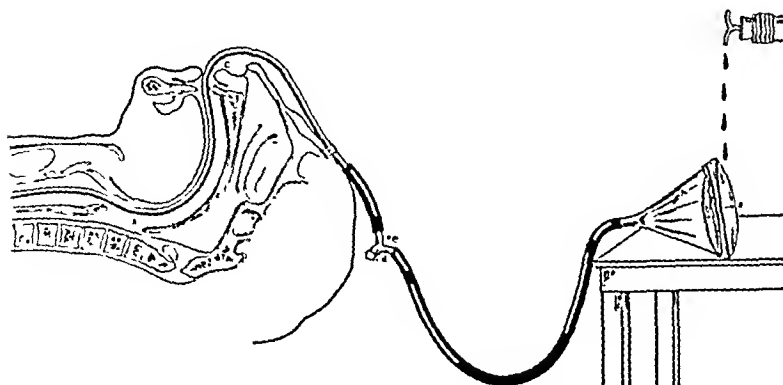


Fig. 1

- a, b. Position of lint during expiration and inspiration respectively.
- c. Intra-tracheal catheter in position.
- d. Cotton-wool plug.
- e. Y tube.
- f. Position of rolled gauze plug.

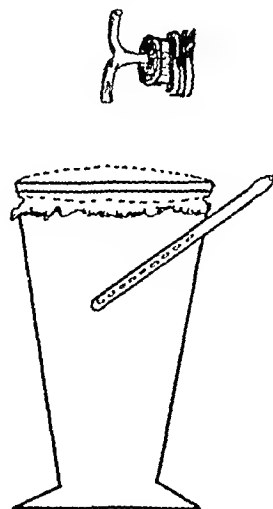


Fig. 2.

any chance of being aspirated into the air passages. The ether vapour can also be warmed to the appropriate temperature by placing the can in a water-bath. Copper is to be preferred for the can because it can be easily made to order, and is cheap in the long run, not being fragile like glass. Moreover copper is an anti-catalyst to ether.

The cotton-wool plug on the third limb of the Y tube is occasionally removed to allow entry of more air. The open end of this limb can also be connected to the delivery tube of an oxygen or carbon-dioxide cylinder if required. The lint may be covered with a towel if a more concentrated ether vapour is necessary at times.

It may appear that having had to breathe through two layers of lint the meshes of which are partially filled with ether undue respiratory efforts are required on the part of the patient and if the process goes on for any length of time the patient may be exhausted. In fact, no such ill effect need be feared as the resistance offered by the lint to the gases during respiration has been found to be below 5 mm. Hg. and no signs of exhaustion were ever noticed after anaesthesia of an hour's duration.

The operations that have been performed under this funnel-lint intra-tracheal anaesthesia are for cleft palate, parotid fistula, mixed parotid tumour, mixed tumour of the sub-maxillary gland, radium implantation in carcinoma of the tongue and cheek, ranula, parenchymatous goitre and adenoma thyroid.

The ages of these patients varied from nine to sixty years, the maximum weight was fourteen stone and the longest duration of operation was fifty minutes. No untoward effects have been observed in any of the cases during the operation or after.

kind encouragement and permission to try this method on his cases.

SOME EXPERIMENTS ON THE ABSORPTION OF INSULIN WITH SPECIAL REFERENCE TO ABSORPTION THROUGH THE NASAL PASSAGES

By F. W. ALLINSON

CAPTAIN, I.M.S.

First Resident Medical Officer, Presidency General Hospital, Calcutta

and
S. PAUL

Biochemist, Presidency General Hospital, Calcutta

THERE is no question that the injection of insulin subcutaneously is at the moment the best method of administration, if exact dosage is necessary and wastage is to be avoided. The giving of insulin however by this method causes a considerable inconvenience to patients, especially children and those who are too poor to afford skilled medical attendance or too ignorant to give their own injections.

Attempts have been made to produce an insulin which will be efficacious if given by mouth, and other glandular and vegetable products and drugs have also been tried but with little or no success. Insulin given by this route has so far failed as the pH of the digestive juices of the mouth and intestinal tract have been unsuitable. The other routes chosen for absorption, such as the ear and conjunctival sac, have been impracticable.

These various paths of absorption have been tried by a considerable number of workers, but we can find no trace in the literature of absorption of insulin through the nasal passages*.

*[Attention is drawn to the following paper:—Major, R. H. (1935). The Intranasal Application of Insulin. *Journ. Lab. and Clin. Med.*, Vol. XXI, p. 278.—EDITOR, I. M. G.]

We first tried this method using the most concentrated solution of insulin on the market, namely, 100 units per c.cm. of solution. As it was obvious that the absorption would not be as great as by injection a much higher dosage was given. Thus in one case a boy who was getting 60 units of zinc protamine insulin daily was given 110 units by the nasal route. It was found that by this method quite an appreciable lowering of the blood sugar occurred, but the difficulty of instilling as much as 1 c.cm. of solution into the nose was a great disadvantage.

We next decided to use a much more concentrated solution of insulin, and for this purpose obtained crystalline insulin from Messrs. Burroughs Wellcome & Co. We used a solution containing roughly 50 units per drop and in most cases two drops were instilled into the nostrils of our diabetic patients. The symptomatic effect on the patients was apparent within half an hour or so, any heaviness in the head or headache disappeared and there was a sense of general well-being. One patient was also relieved of a tingling sensation in the head and hands. The blood sugar examinations showed a marked reduction in the first 2 hours after instillation of the insulin into the nose, and the urine, which was loaded with sugar before, showed a marked change in sugar content when tested with Benedict's solution.

The results of our experiments are given below and it will be seen that insulin is absorbed by the nasal mucous membrane to a greater extent than from the other mucous surfaces yet tried. The great advantages of this route of absorption are obvious, but the disadvantages are the expense, as large quantities of insulin are required, and the difficulty in estimating the exact dosage; this will probably vary with different

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THE TREATMENT OF ACUTE AND CHRONIC DIARRHŒA WITH A SALT-FREE DIET*

By PROFESSOR DR. HUGO SALOMON
Buenos Aires

THE principles for the treatment of diarrhœa have changed in the last few decades. Little by little the dogma of the treatment of acute diarrhœa by giving a laxative to remove as soon as possible the 'materia peccans' toxic substances, secondarily formed, is being questioned. The therapeutical act of giving a laxative very often causes a diarrhœa that is difficult to interrupt. One does not know how the illness would have developed without a laxative, but during the course of a very long experience I have come to the conclusion that the course of the illness is more favourable, if one has confidence that the body will clear itself sufficiently by the severe diarrhœa, without it being necessary to increase this diarrhœa. I have defended this opinion already in an article on the treatment of dysentery (Salomon 1915).

*Rearranged by the Editor.

(Continued from previous column)

individuals and with varying conditions of the nasal mucous membrane at any given time.

It is early to assess the value of these experiments, but we feel that it is worth publishing our results (incomplete as they are) as with further work they may prove of some value to those engaged in research work and interested in the problems of the unfortunate diabetic.

Case	AFTER LIGHT BREAKFAST		INSULIN	1 HOUR AFTER INSULIN		2 HOURS AFTER INSULIN		4 HOURS AFTER INSULIN	
	Blood sugar	Urine sugar		Blood sugar	Urine sugar	Blood sugar	Urine sugar	Blood sugar	Urine sugar
A ₁	219	+++	110 units by nasal route.	186	+	160	Nil	..	..
A ₂	230	+++	Do.	197	++	154	Nil	..	..
A ₃	236	+++	154 units orally	230	+++	220	+++	..	..
A ₄	215	+++	60 units by injection.	193	++	148	Nil	..	..
A ₅	223	+++	Nil	236	+++	219	+++	..	..
B ₁	183	+	110 units by nasal route.	168	Trace	142	Nil	..	..
B ₂	189	+	Do.	170	"	130	Nil	..	..
B ₃	193	+	Nil	187	+	169	Trace	..	..
C ₁	296	+	110 units by nasal route.	219	+	173	Trace	..	..
C ₂	273	+	Do.	204	+	170	"	..	..
D	302	+++	Do.	242	++	182	Trace	173	Nil
E	217	+++	Do.	189	+	144	Nil	137	Nil

By the systematic use of laxatives in diarrhoea, serious states of illness can be provoked. Only cases of a definite alimentary intoxication can offer occasionally an indication for such treatment. Just as in the most intensive state of diarrhoea we know, namely, cholera, nobody would think of giving laxatives.

On theoretical grounds Salomon and Wallace gave patients suffering from acute enteritis sweet tea and fruit juices. According to their expectations, the authors observed a rapid ceasing of diarrhoea. They expressed the opinion that they knew no better measure to stop acute diarrhoea.

Later, von Noorden and Salomon (1929) used 'marchepan' (almond powder mixed with equal parts of powdered sugar and with a little white of egg) and different kinds of fruits. They came to the conclusion: one frequently has the surprising experience that one provokes diarrhoea only if fruits and their derivatives are mixed with other food substances. The exclusive administration of fruits and fruit juices has the effect of a direct remedy.

Similar experience has been reported in the treatment of sprue, e.g., by the strawberry diet. I have now come to the conclusion that one can take without danger in diarrhoeal illnesses fruits with other aliments as long as to the latter salt is not added.

Later on, came the reports of Heisler (1928) and of Moro (1929) about the effects of the apple treatment in acute diarrhoeas.

There are numerous explanations given to the apparently paradoxical effect of exclusive fruit diet in diarrhoea (Salomon, 1936), but my own practical experience has convinced me that the effective factor, the link connecting these various observations, is the absence of salt from fruits. Since one can mix fruits with other salt-free food, with sweet soups, with sweet biscuits, etc., without damaging the effect. As soon as the acute phases of the attack have passed, puddings, *soufflés*, etc., are also harmless, that means dishes which are prepared with little milk (percentage of salt in the milk 1.5 to 1.8 grammes per litre).

I give two examples.

Case 1.—Male, aged 55 years, generally healthy, with normal blood pressure, fell ill suddenly before breakfast with pains in the abdomen on 5th May. Evacuations at first were soft, later watery with vomiting of sour mucus only. Pulse 88, soft, temperature 37.6°C.

On account of nausea and want of appetite all food including purée of apples was refused. At 11 o'clock 10 drops of tincture of opium. Up to 12 o'clock he had 8 watery dejections then the diarrhoea ceased.

At 6 p.m. a vanilla ice was taken.

6th May.—He had a quiet night. Temperature 36.8°C., some pain in the abdomen, 3 watery dejections before breakfast.

Breakfast: porridge with milk, tea with sugar, sweet bread.

Lunch: Caramel custard, jelly of wine.

Tea: Tea with sugar, confectionery.

Dinner: Cold rice boiled, with milk and sugar; compot of pears.

He had no trouble and during the day no evacuation.

7th May.—Breakfast: porridge with milk and sugar, compot of apricots, tea with sugar, sweet biscuits.

Lunch: pancakes filled with marmalade, *soufflé* of sago, apples.

Tea: Tea with sugar, confectionery.

Dinner: Barley soup, sweet *soufflé* of rice, compot of pears.

No stools, good state of health.

8th May.—Return to ordinary mixed low-salt diet. First dejection at 5 p.m., well formed, subsequently he remained in good health.

The same good results will be found in the treatment of chronic diarrhoea with salt-free diet. The following case seems to me very illustrative, as the patient was living in a hotel at Saigon where the treatment naturally was more difficult than in hospital or in a private house.

Case 2.—Male, aged 65 years, constitutionally healthy.

For some weeks, from time to time, specially after meals, he had pains in the abdomen, the dejections were soft and thin, 4 to 6 times in the 24 hours, with considerable quantity of slime. Appetite was good. By omitting vegetables, fruits and coarse bread, and using carbonate of lime 4 to 6 grammes a day, constipation and good health were attained, but returning to the ordinary diet there was a great tendency to relapse.

23rd May.—Three thin evacuations, with some mucus; pain in the bowels; appetite and general state good.

Mixed diet taken with caution.

24th May.—More colic, 4 thin dejections, state of health generally worse. Fruits and compots now omitted. Carbonate of lime 4 grammes taken.

25th May.—No change, 4 soft stools.

26th May.—Slept well: at 5 o'clock pains and soft stool.

8 a.m.: Tea with sugar, barley soup cooked with *maggi* and a little salt and butter.

10-30 a.m.: Pains and thin evacuation and later severe pains and watery dejection, with tenesmus.

Beginning of the nutrition with salt-free diet

2 p.m.: Tea with sugar.

5 p.m.: Barley water sweetened with 4 pieces of sugar.

8 p.m.: Feeling well, a glass of pineapple sorbet, 3 sweet biscuits.

Noises in the bowels, no pain.

27th May.—Good night, flatulence, but no stool.

8 a.m.: Half a tin of apricots with the juice.

11 a.m. Pea soup and the other half of the tin of apricots.

Lunch: Two mandarines, 2 mangostines, stewed pears, and pastry.

Dinner: The same as for lunch.

28th May.—No trouble; no stool, but a small quantity of slime was evacuated.

Breakfast: Tea with sugar, white bread with raspberry jam, one apple, one banana.

Lunch: Fruit tart, 2 mandarines, 2 mangostines.

Dinner: As above with a sweet omelette.

29th May.—First stool since 27th May, small quantity, well formed.

Under slow transition to a mixed diet with a moderate allowance of salt, the patient returned to good health.

During this observation it was evident that the salt-free diet influenced the state of the bowels in a more favourable manner than the salt-containing diet, although the latter was less offensive from the point of view of its cellulose content.

For carrying out a salt-free diet all our food-stuffs are suitable, because they are nearly free

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INJECTION METHOD OF TREATING ENLARGED INGUINAL GLANDS IN EARLY CASES OF LYMPHOPATHIA VENEREUM (LYMPHOGRANULOMA INGUINALE)*

By MIN SEIN, M.B. (Cal.), M.R.C.P. (Lond.),
CAPTAIN, I.M.S.

Civil Surgeon, Rangoon (East) and Lecturer in
Medicine, Burma Government Medical School,
Rangoon

DURING recent years more and more cases of lymphopathia venereum (lymphogramuloma inguinale) are being diagnosed as the clinical features and tests are better understood. If left untreated, or even in treated cases, the disease can result in much suffering and disfiguring due to scarring. Of the local method of treatment chief reliance has been placed on the time-honoured belladonna and ichthyol ointment in the early stages, and fomentations and incision in later periods. The time spent in

* Note.—The nomenclature of this disease has undergone a number of changes, and until a few years ago 'lymphogramuloma inguinale' was favoured by the majority of writers. This name was unsuitable, mainly because the pathological process is essentially unlike a granuloma and the name lymphopathia venereum seems to find most favour to-day. This is the term adopted by Dr. H. S. Stannus in the *British Encyclopædia of Medical Practice*. As uniformity is advisable we have changed the title and text of this paper in accordance with modern usage.—EDITOR, I. M. G.

(Continued at foot of next page)

from salt by nature and only the milk contains a small quantity, but many dishes, for instance vegetables and soups, are not very palatable without salt. The most suitable dishes are sweet, as sugar compensates for salt in a splendid manner. Soups of oatmeal, barley, peas, lentils, etc., can all be sweetened with sugar. Fresh butter (unsalted) can be added if the state of general nutrition demands. Eggs, boiled or fried, or as an omelette, can be given, and also fruits and nuts. Soon it is possible to add sweet dishes which have been made with milk—custards, puddings, pancakes, ice-cream, tarts and confectionery.

Now on a long visit through India, I publish my views hoping that they will be useful to doctors in the treatment of cholera as well as acute and chronic dysentery.

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palliative treatment can be long and in the end prove to be fruitless.

The following method is published as it has proved its worth and is simple in application. I started using this method in 1932 whilst in charge of the venereal ward in the British Military Hospital (Indian Wing), Mingaladon, in cases of venereal bubos secondary to soft or hard chancres or gonorrhoeal urethritis after the ordinary palliative methods had failed. It was also used in cases where though a history of venereal exposure was obtained clinical and laboratory examinations negated an infection by syphilis, gonorrhoea or soft sore. It was possible that some of the latter cases were cases of lymphopathia venereum. Since then fairly typical cases have been similarly treated with success and the treatment has been extended to cases of bubo due to venereal diseases.

The method

The method consists in the injection of a few minims of equal parts of liquid carbolic acid and absolute alcohol into the enlarged glands. A fine hypodermic needle is selected and the syringe filled with the solution. After the skin has been sterilized with methylated spirit it is stretched and the needle is inserted some distance from the gland; it is then pushed obliquely into the centre of the enlarged gland. After seeing that it is not in a blood vessel the solution is injected. It is advisable to push in a few minims of air to empty the needle otherwise carbolic acid is likely to be left along the track of the needle and slight pain might result. Frequently, a small depressed black spot will mark the site of injection. No pain is felt and improvement in signs and symptoms will be noticed within 24 hours. The enlarged and painful gland will generally subside without proceeding on to suppuration. It may be necessary to give more injections into the same or other enlarged glands after two or three days' interval. The above method is not meant for cases where there is definite softening and commencing suppuration but is useful where the glands are painful and enlarged.

I have treated several cases by this method but a typical case is described below.

A Burmese police constable, aged 22, was admitted to Bhamo Civil Hospital on the 16th May, 1935, on account of hard and painful glands in the left inguinal region. He had developed a small sore on the penis after exposure and this healed up in four days. He had a temperature of 100°F. He was treated with belladonna and ichthyol ointment and tincture of iodine intravenously. There was no improvement, but on the other hand the glands on the right side also became enlarged and tender in spite of applications of antiphlogistine. Carbolic acid solution was injected into the glands on four occasions, on the 21st June, 27th June (two areas), 1st July (two lower glands), 8th July (other glands). Improvement was rapid and sustained and the patient was discharged cured on the 10th July, 1935. He was examined again in November 1935 when the cure was found to have been sustained. The Wassermann reaction was negative.

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ON THE EFFICACY OF THE GONADOTROPIC HORMONES IN THE TREATMENT OF WHOOPING COUGH

By K. VENKATACHALAM

and

A. N. RATNAGIRISWARAN

From the Medical College, Madras

It is characteristic of whooping cough that its incidence is confined chiefly to children below 10 years of age, though occasionally it has also been reported in old people. Persons above the age of 10 and right through healthy adult life are generally immune to the disease, in spite of living in intimate contact with infected children, even though they might not have been attacked previously by any disease having the vaguest semblance of whooping cough. Second attacks in children have also been recorded though only rarely. Further, the vaccines prepared from the organisms isolated from the droplets or the upper respiratory passages of infected children have not been as effective therapeutically as they ought to be if the disease were caused only by infection.

These considerations suggested that, besides any immunity that might have been acquired, there is some other factor which is peculiar only to the period of life between the age of 10 and the end of the adult age that determines the power to resist an attack of whooping cough during this period. One of the dominant features of life at this stage is the activity of the sex glands, and the assumption that the immunity displayed is associated with such activity would be justified, if it could be demonstrated by any means that a temporary stimulation of the activity of the gonads in persons of the susceptible age would act as a curative, as well as a prophylactic, agent. Results of the clinical trials carried out so far have provided sufficient evidence for the correctness of this view.

In the clinical investigation reported in this paper, the stimulation of the gonads was effected either by the oral administration of a standardized preparation of the gonadotropic hormones of pregnancy urine which is described in detail below, or by the injection of Antuitrin 'S'. The latter could not be tried as a routine measure on account of the prohibitive cost and was resorted to only when the oral medication had been ineffective.

*(Continued from previous page)**Summary*

A method of treating enlarged glands in lymphopathia venereum (lymphogranuloma inguinale) as well as in other venereal conditions is described in which 50 per cent carbolic acid in absolute alcohol is injected into them.

A case is described.

The standardized preparation of the hormones for oral administration was prepared in this laboratory by a modification of the method of Davy (1934). Pregnancy urine was acidified with glacial acetic acid to a pH 5 using brom-cresol-green as the indicator. The urine was centrifuged or filtered if it did not become clear by centrifugalization. To every litre of the clear urine 10 g. of active charcoal was added and the mixtures shaken continuously in a mechanical shaker for eight hours. The pH was again adjusted to 5 and the charcoal containing the adsorbed hormones was filtered under suction on a hardened filter paper moistened with 1 per cent acetic acid. It was washed well with water till the wash water was neutral to litmus, dried, and stored in a vacuum desiccator at a temperature of 15°C.

The activity of the preparation was tested in each case by the usual biological method using 13 days old, immature, female white rats as the test animals. The rats were selected from a litter in which the animals attained sexual maturity 40 to 50 days from the day of birth. The charcoal adsorbate suspended in distilled water was poured down the throat of the animal by means of a fine pipette. Based on our findings, a rat unit was taken as the minimum amount of the product which produced opening of the vagina and œstrus on the seventeenth day of age, when administered orally in eight equal doses during four consecutive days. One rat unit was contained in 10 milligrams of the preparation.

Five hundred to nine hundred rat units, the exact requirement depending upon the virulence of the disease and the individual variations, were usually found sufficient to alleviate the characteristic symptoms. Where parenteral administration was indicated, 0.25 c.cm. of Antuitrin 'S' was injected daily. After six to twelve injections, the vomiting and the whooping stopped completely. The residual cough was treated symptomatically. The criterion of cure applied was the total disappearance of the whoops and vomiting and a diminution of the cough.

All the cases reported herein were treated under our personal supervision and guidance.

A perusal of the table will show that in all the cases the blood picture had been typical. There was a marked leucocytosis of 12,000 to 30,000 per c.mm. with 46 to 76 per cent of lymphocytes. Twenty cases out of the 23, or 87 per cent, were cured by oral treatment with the hormones or by injection of Antuitrin 'S'; in three cases, or 13 per cent, either treatment failed. The proportion of probable cures to failures in this series is 5.1:1. In the therapeutic doses prescribed, the preparation of the hormones did not produce any undesirable symptoms.

No case of whooping cough in old age has come to our notice so far.

The administration of the hormones as a prophylactic measure to contacts conferred immunity on them.

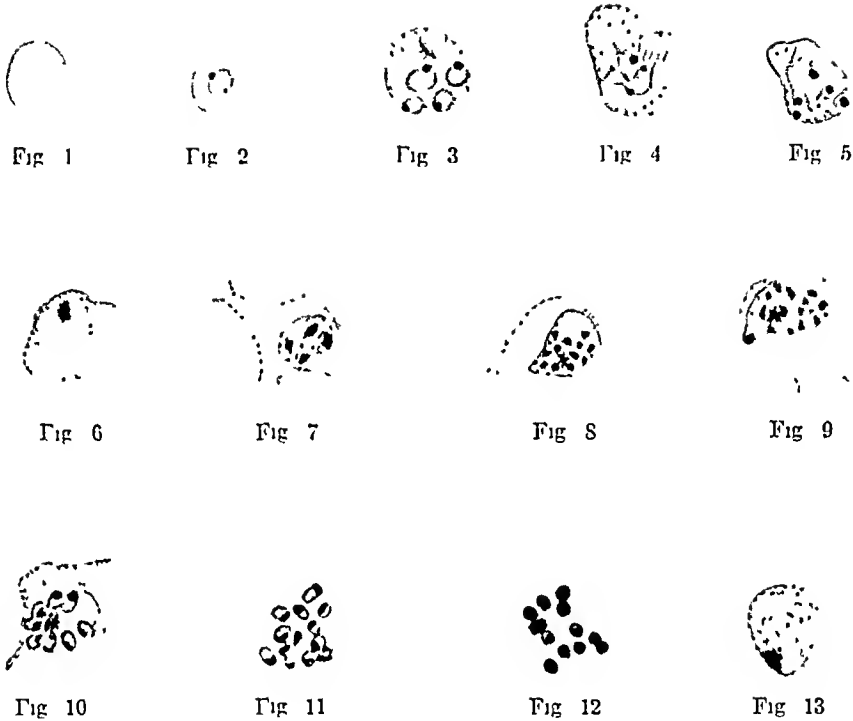
In another series of 113 cases which were treated by qualified allopathic medical
(Continued at foot of opposite page)

Table of cases treated with the gonadotropic hormones

Number	Race, sex, and age, in years	Duration of symptoms, whooping and vomiting, in weeks	Total leucocyte count, per c.mm.	Lymphocytes, percentage	Treatment	REMARKS
1	H. M., 1 $\frac{1}{2}$	3	16,000	55	Charcoal adsorbate of the hormones, in honey, orally, 5 gr. 4 times daily for 5 days.	Symptoms relieved.
2	H. M., 1 $\frac{1}{2}$	2	20,000	56	Charcoal adsorbate of the hormones, in honey, orally, 5 gr. 4 times daily for 4 days.	Do.
3	H. F., 2	4	22,000	62	Charcoal adsorbate of the hormones, in honey, orally, 5 gr. 4 times daily for 6 days.	Do.
4	H. F., 1 $\frac{1}{2}$	3	18,000	58	Charcoal adsorbate of the hormones, in honey, orally, 5 gr. 4 times daily for 6 days.	Do.
5	H. M., 1 $\frac{1}{2}$	6	21,000	76	Charcoal adsorbate of the hormones, in honey, orally, 5 gr. 4 times daily for 8 days.	Do.
6	H. F., 1 $\frac{1}{2}$	4	15,000	50	Charcoal adsorbate of the hormones, in honey, orally, 5 gr. 4 times daily for 5 days.	Do.
7	H. M., 1 $\frac{1}{2}$	5	24,000	70	Charcoal adsorbate of the hormones, in honey, orally, 5 gr. 4 times daily for 8 days.	Ineffective.
8	H. M., 2	6	22,000	60	Antuitrin 'S', 0.25 c.cm. daily for 6 days.	Symptoms relieved.
9	H. F., 3	4	25,000	64	Charcoal adsorbate orally for 6 days.	Do.
10	H. F., 2	6	26,000	70	Charcoal adsorbate orally for 8 days.	Do.
11	H. F., 1 $\frac{1}{2}$	8	30,000	72	Charcoal adsorbate orally for 8 days.	Ineffective.
12	H. F., 3	6	20,000	60	Antuitrin 'S', 0.25 c.cm. daily for 8 days.	Failed to cure.
13	H. F., 3 $\frac{1}{2}$	8	22,000	66	Charcoal adsorbate orally for 8 days.	Failed.
14	H. M., 4	2	15,000	46	Antuitrin 'S' for 10 days.	Do.
15	H. F., 2	4	28,000	70	Hormones orally for 6 days	Symptoms relieved.
16	H. F., 2	4	20,000	62	Both oral and parenteral administration.	Failed.
17	H. F., 1 $\frac{1}{2}$	4	16,000	48	Hormones orally for 8 days	Symptoms relieved.
18	H. M., 2	5	12,000	50	Charcoal adsorbate of hormones for 6 days.	Do.
19	H. M., 2 $\frac{1}{2}$	4	16,000	48	Charcoal adsorbate of hormones for 4 days.	Do.
20	H. F., 2	4	12,000	50	Charcoal adsorbate of hormones for 4 days.	Do.
21	H. F., 1 $\frac{1}{2}$	2	15,000	52	Charcoal adsorbate of hormones for 6 days.	Cured.
22	H. F., 1 $\frac{1}{2}$	6	20,000	65	Charcoal adsorbate of hormones for 8 days.	Ineffective.
23	H. F., 2 $\frac{1}{2}$	4	28,000	70	Antuitrin 'S', 0.25 c.cm. for 6 days.	Symptoms relieved.
					Antuitrin 'S', 0.25 c.cm. for 8 days.	Failed.

Abbreviations used: H.=Hindu; M.=Male; F.=Female.

PLATE X



One division equals 10 μ

EXPLANATION OF PLATE X

- Fig 1—Normal red blood corpuscle
- Fig 2—Young ring form showing a minute accessory chromatin dot in addition to the main chromatin mass
- Fig 3—Four ring forms in one corpuscle
- Figs 4 to 6—Growing forms exhibiting amoeboid changes Figures 4 and 5 also show multiple infections of the corpuscle
- Fig 7—Developing schizont contained in a fimbriated and stippled corpuscle
- Fig 8—Full-grown schizont with twelve masses of chromatin
- Fig 9—Two schizonts in the same corpuscle
- Fig 10—Mature schizont containing eight merozoites
- Figs 11 and 12—Ruptured schizonts
- Fig 13—Female gametocyte

SOME ANOMALIES IN THE MORPHOLOGY OF *PLASMODIUM VIVAX* OCCURRING IN A NEWBORN BABY

By B. M. DAS GUPTA

From the Calcutta School of Tropical Medicine

THE material on which the following observations were based consists of a single blood smear

(Continued from previous page)

practitioners in the city and the *mofussil*, 70 cases were reported to have derived benefit by the oral medication and 13 more by the injection of Antuitrin 'S', as judged by the alleviation of the distressing symptoms such as whooping, vomiting and cough. Blood examination could not be carried out in those cases for lack of laboratory facilities. The percentage of cures in this series works out to 73.5 per cent.

For the whole series of 136 cases which have been treated with the gonadotropic hormones of pregnancy urine, the percentage of cures effected is 80.3.

In cases where treatment by the parenteral route was called for, the failure of the oral method was probably due to a co-existing gastrointestinal disturbance that might have interfered with the absorption of the hormones. In the other cases which were resistant to either form of treatment, the cause of the failure might have been an imbalance of the endocrines preventing the gonadotropic hormones from exerting their usual effects. Also in those rare cases where adults have been reported to have been victims of whooping cough a possible explanation is the malfunction or dysfunction of the gonads.

The relief from the most distressing symptoms of whooping cough effected in such a short time as about a week, by the administration of the gonadotropic hormones appears to warrant the conclusion that in these hormones has been found a useful and unsuspected remedy for combating the harassing disease.

Summary

On the ground that whooping cough is a disease that shows a preference for attacking children below 10 years of age, and old persons occasionally, and that adults are invariably immune to it, it was considered probable that the power to resist and overcome the disease might be closely associated with the activity of the sex glands, the dominant feature of adult life. Based on this assumption, treatment with a charcoal adsorbate of the gonadotropic hormones of pregnancy urine or with Antuitrin 'S' was carried out in a series of 136 children and yielded satisfactory results in 80.3 per cent of the cases. The drug was also found to be effective as a prophylactic remedy.

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taken from an infant 15 hours after birth. There was evidence of anaemia in the smear. Infection was quite heavy, so it was possible to study a large number of parasites in various stages of development. The infected corpuscles were enlarged, pale and showed marked pink stippling. Many cells were distorted, some showing fimbriated margins. Multiple infections of the corpuscle were not infrequent, and as many as five parasites occurred in one cell. In some ring forms the chromatin appeared as two dots, one much finer than the other. This type of chromatin is frequently encountered in the ring forms of *Plasmodium knowlesi* in *Silenus rhesus* monkeys, specially when the infection is very intense. Various stages of schizogony and a few gametocytes were present. Growing trophozoites exhibited marked amoeboid activity, although some were quite compact. The most striking feature was the number of merozoites produced by the schizonts. About a dozen fully-developed schizonts were examined, in none of which did the number of merozoites exceed twelve. The cells containing these schizonts were abundantly stippled.

Comments.—At first sight I felt tempted to believe that the infant had been infected with *Plasmodium ovale* Stephens, 1922, because some of the forms present in the smear, especially figures 7 to 10, bore a striking resemblance to those of *P. ovale*. But in view of the facts stated below my impression is that the infecting organism was *P. vivax* with some aberration in its morphological characters, an observation to which attention has been drawn from time to time by various observers. Thus, Missiroli and Siniscalchi (1929) studied morphological changes in a strain of *P. vivax* up to its sixth passage by direct blood inoculation. They examined the blood films of all the patients infected with this strain and noted that in some films the parasites were typical of *P. vivax*, in some parasites resembling *tenue* type of *P. falciparum*, while in others parasites resembling some stages of *P. ovale* were present. Plehn (1925) made similar observations as regards forms resembling *P. ovale*. Observations of the same kind have also been recorded in particular cases of naturally acquired infection. For example, James (1920) found that in some old-standing cases of benign tertian infection, acquired during the war, full-grown schizonts contained only 10 to 12 'young parasites'. Moreover, the red cells in which they lay, although they were profusely spotted with Schüffner's dots, were only slightly enlarged.

Wenyon (1926) while discussing the doubtful species or abnormal forms of human malaria parasites observed 'It cannot be too forcibly emphasized that the parasites of malaria like all other living organisms are liable to occur occasionally in abnormal forms, and that more evidence than the mere casual appearance of these is required before new species are created'.

The fact that the mother's blood during pregnancy showed definite benign tertian infection, as reported by Dr. Baird who was in charge of the patient, also tends to support the impression of the present writer that the stages of the parasite resembling *P. ovale* are in reality an unusual form of *P. vivax*.

Dr. Wenyon who also very kindly examined this specimen was non-committal with regard to the unusually small number of merozoites, but suggested that the unusual situation of the host (mother's womb), or the anæmic condition of its blood, might have influenced the development in some way. He further observed that if the morphology of the parasite after the inoculation into a new host remained constant there might be some reason for considering it to be a variety of *P. vivax*.

From time to time many reports have been published regarding the possibility of congenital malaria. As the parasites may be directly inoculated from the mother to the child as a result of abrasions occurring during labour and as the chances of natural infection cannot be ruled out in cases in which the parasites are found any time after birth beyond the usual incubation period of malaria, especially in localities where the disease is prevalent, critics are inclined to doubt the authenticity of the reports of congenital malaria based on mere finding of the parasites in the blood of the newly-born infants. Lately, however, Garcia (1938) reported two cases of intra-uterine infection. In one case schizonts of *P. falciparum* were found in the bone marrow, heart blood, and in other situations of a four-month fœtus found *in situ* in the womb of its mother who died of malignant tertian malaria. The demonstration of a large number of parasites in various stages of development up to maturity in our case is also highly significant, in that it proves beyond any doubt that the infection was acquired some time previous to labour.

I wish to make acknowledgment to Professor C. Strickland for securing the slide in question and to Dr. Baird of Bhagatpur Tea Estate (Dooars), who was in charge of the patient for supplying me with some information given in this paper. I am also under great obligation to Dr. C. M. Wenyon, F.R.S., for his valuable suggestions.

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VITAMIN C IN PULMONARY TUBERCULOSIS

By I. BAKHSH, M.D. (Lond.), M.R.C.P. (Lond)
CAPTAIN, I.M.S.

Professor of Pharmacology and Therapeutics, K. E. Medical College and Physician to Out-Patients, Mayo Hospital, Lahore
and

M. RABBANI, M.B., B.S., P.C.M.S.

Demonstrator in the Department of Pharmacology and Therapeutics and M. O., T. B. Out-Patients, Mayo Hospital, Lahore

HASSELBACH (1936) in Switzerland recommended the use of vitamin C in cases of pulmonary tuberculosis deficient in this vitamin. He obtained favourable results in certain forms of pulmonary hæmorrhage, and advocated it as a tonic in sufferers from pulmonary tuberculosis.

A year later, Petter (1937) in America published a report on 49 adults and 21 children treated by him with calcium phosphate in milk and 150 mg. of vitamin C by mouth daily. Thirty or 61 per cent. of the adults were definitely improved, 12 were unaffected and 7 were definitely worse. In the children he also noted improvement in weight and general condition. Tests for vitamin-C excretion in urine showed decreased elimination of the vitamin in advanced cases.

Shortly afterwards, Borsalino (1937) published his observations on the therapeutic value of vitamin C in tuberculosis. He found that injections of vitamin C increased the resistance of capillaries in this disease. This increase progressed for the first 12 hours after the injection, then it diminished slowly till it was the same after 24 hours. In his opinion vitamin C had a favourable symptomatic effect by which the general condition and appetite of the patients were improved and the fever and quantity of sputum were favourably modified. The anatomic condition of the lungs was unchanged. He also found that actual hæmoptysis stopped after injection, but reappeared on stopping the treatment.

Radford and her colleagues (1937) tried vitamin C in cases of advanced and fibroid tuberculosis. They gave no other therapy except routine rest, and obtained encouraging results as judged by red cell count, hæmoglobin, lymphocytes, monocyte-lymphocyte ratio and neutrophil-lymphocyte ratio. According to these observers the improvement in the hæmoglobin and red cell figures indicates a possible hæmatinic effect.

Heise and Martin (1936), however, do not agree with the above findings. They injected tubercle bacilli (300,000) into the groin of guinea-pigs on normal diet and in those receiving 20 mg. of vitamin C intra-abdominally. Their results did not demonstrate any support for excessive administration of vitamin C in tuberculosis. An obvious objection to their experiments was the large number of bacilli

introduced into an animal like the guinea-pig which has little resistance against tuberculosis; secondly, the number of animals used in their experiments was too small.

Martin and Heise (1937) later tried the effects of vitamin C in pulmonary tuberculosis on a series of cases. Again they did not obtain any evidence of the effect of vitamin-C therapy on the course of pulmonary tuberculosis, as judged by ray, sputum examination, sedimentation rate, and tuberculin skin tests. They also noted that intravenous vitamin C failed to stop the hæmorrhages in tuberculous patients. The authors believed that vitamin C does improve the prognosis in pulmonary tuberculosis but no definite evidence was obtained for this impression.

More recently, Hurford (1938) has tried the effects of vitamin-C therapy in pulmonary tuberculosis in England. In a series of 66 cases he found 64 per cent of the patients to be suffering from hypovitaminosis, taking the minimum normal limit of vitamin-C excretion in the urine as 14 milligrammes. This observer found no constant relationship between vitamin-C excretion and the sedimentation rate, von Bonsdorff count, or the extent of the disease. Of the 42 patients treated with this vitamin only 7 showed any significant improvement and these patients were suffering from microcytic anaemia.

From the above it is clear that vitamin-C excretion is greatly decreased in the majority of cases of pulmonary tuberculosis and there is uniformity of opinion among workers all over the world on this point. But there is no agreement on the question whether vitamin C has any influence on the clinical condition in pulmonary tuberculosis, as is shown by the conflicting reports. In this country we are not aware of any published work on this subject. One of us (I. B.) has been using large doses of vitamin C in his private cases with variable results. It is, however, extremely difficult to assess the value of this remedy in this way as these patients were receiving other forms of treatment at the same time.

The present confusion about the value of vitamin-C therapy in tuberculosis prompted us to try it on a controlled series of cases in the tuberculosis wards of Mayo Hospital, Lahore.

In selecting our cases the following points were kept in view. Realizing that the standard of nutrition of the majority of cases admitted into the general wards of this hospital is below normal, all the selected cases had been kept for a sufficiently long period in hospital to correct any gross dietary deficiency and to exclude the apparent effects of rest in bed. As a rule only early cases with sufficient chances of recovery are admitted into the tuberculosis wards of this hospital, so that none of the patients were suffering from advanced disease. Furthermore, only those cases were selected who had not improved on the usual lines of treatment, such

as rest in bed, cod-liver oil, gold injections and artificial pneumothorax, or else those in whom gold therapy and pneumothorax had been considered unsuitable.

Of the 24 cases thus selected, 19 showed deficient excretion of vitamin C in the urine, as estimated by the method of Harris and Ray (1935). With the exception of one case who excreted only 4 milligrammes in 24 hours, the figures were between 10 and 16 milligrammes. No. 6 excreted 55 milligrammes in 24 hours but was included in the series because he looked very weak, pale and ill-nourished. Fourteen cases had unilateral lesions and in 6 both the lungs were affected. With the exception of one case of chronic fibroid tuberculosis the rest were all of the mixed exudative type. Three cases gave a history of hæmoptysis during the onset of the disease.

All the patients were given 150 to 200 milligrammes of vitamin C in tablet form by mouth daily over a period of six weeks. In addition every case received 500 milligrammes of the vitamin daily by intramuscular injection for four days during the first week of treatment. As tuberculous patients are very suggestible, due precautions were taken to administer the preparation in a casual way and to avoid the impression that they were getting a new and important drug.

The points noted were the patients' own feelings of well-being, appetite, weight, cough, expectoration, temperature, changes in hæmoglobin, red cell counts, and sedimentation rates, together with clinical examination of the lungs at weekly intervals.

Three patients left the hospital of their own accord during the early part of the treatment as their condition deteriorated greatly. One of these, a female with a history of previous hæmoptysis, who was receiving 200 milligrammes of vitamin C daily, developed a severe attack of pulmonary hæmorrhage which could not be controlled by any means including injections of vitamin C. She was removed from the hospital in a moribund condition by her relatives.

The result of six weeks' treatment with vitamin C in the remaining 17 cases is given in the following table.

As will be seen from the table the appetite was favourably affected in two cases only. The increase in weight, however, occurred in ten patients, this ranged from one pound in four cases to 21 pounds in five and 3 in one case. The weight in two cases remained stationary, five patients lost weight varying from 1 to 4 pounds, while one lost 8 pounds. The two patients who showed improved appetite gained 3 pounds and 1 pound respectively.

The cough, as reported by the patients, was lessened in 8 cases, in 1 it was increased, and in the remaining 8 it was uninfluenced. The expectoration, however, was decreased in only 3 cases in which the cough was diminished.

Tabular summary of results

Case number	Vitamin C excretion in urine in mgm.	Appetite and feeling of well-being	WEIGHT IN L.B.		Cough	Expectoration	Temperature	RED BLOOD CELL COUNT IN 10 ⁶ PER C.M.M.		HÆMOGLOBIN PERCENTAGE		SEDIMENTATION RATE	
			Before	After				Before	After	Before	After	Before	After
1	16	Same	79	81	Less	Same	Increased	5.00	4.50	80	80	90	80
2	12	"	37	38		Less		3.00	2.00	70	65	40	35
3	14	"	68	68	Nil	Nil	Same	3.00	6.00	70	70	101	60*
4	13	Less	102	99	Increased	Increased	Increased	4.00	6.30	70	85	67	76
5	21	Slightly better	102	105	Less	Less	Same	4.00	4.00	75	75	50	55
6	55	Same	94	96	Same	Same	Slight increase.	4.50	4.80	70	70	93	98
7	14.5	Less	90	90	Less	Less	Same	4.59	6.00	70	70	120	56†
8	25	Same	92	81	"	Same	Increased	2.66	5.00	80	70	105	47
9	16	"	79	81	"	"	Same	5.00	5.50	80	80	90	82
10	12	"	61	60	Same	"	"	3.50	5.50	70	75	95	88
11	19	"	41	42	"	"	Increased	4.80	6.00	70	70	55	105
12	4	"	72	68	"	"	"	4.80	"	65	"	150‡	"
13	11	"	84	"	"	"	"	4.00	"	80	"	80§	"
14	12	Less	102	100	Same	Same	Same	6.30	6.40	80	80	60	41
15	19	Same	110	111	Less	"	Slight increase.	6.20	6.40	80	70	75	110
16	16	"	117	119	Same	"	Increased	6.00	5.60	75	75	64	55
17	10	"	126	128	"	"	Same	3.70	5.00	75	75	44	54
18	20	Less	105	102	"	"	Increased	5.60	6.40	80	70	55	87
19	12	Better	91	95	Less	"	Less	5.45	6.00	75	75	55	42
20	14	"	104	"	"	"	"	6.30	"	85	"	76||	"

* There was no cough or expectoration before.

† Developed hæmoptysis stopped by A.P.

‡ Condition became worse and patient left.

§ Developed severe hæmoptysis which could not be controlled, and the patient was taken home.

|| Left the hospital.

An interesting point, which was also noted previously by one of us (I. B.) in his private cases, was the initial rise of temperature, whether the vitamin was given by mouth or parenterally. In the present series ten patients showed rises of temperature varying from 1°F. to 3°F. which lasted for 3 to 4 days. It is difficult to give any explanation for this phenomenon, and we are not aware of any reference to this point in the literature. It is apparently seen only in cases of pulmonary tuberculosis for in most other diseases in which the same brand of vitamin C was used no appreciable rise in temperature was observed.

The hæmatological findings were more favourably influenced. Thirteen cases showed an increase in the total red cell counts, ranging from 100,000 to the maximum of 3,000,000 cells per c.mm. The rise in hæmoglobin, however, did not go parallel with the increase in the number of red cells. In most cases in which the red cells were increased the hæmoglobin percentage remained stationary. In two cases it fell by 10 per cent although the red cells had increased by 200,000 and 800,000 per c.mm. respectively. In spite of the danger of forming any definite conclusions from such a small series of cases we are tempted to attribute the blood changes to a specific effect of vitamin C on the red cell manufacturing function of the bone-marrow.

In eleven cases the sedimentation rate was appreciably reduced, the maximum reduction being 64 and 41 mm. in cases 7 and 3 respectively. This favourable effect on the sedimentation rate went parallel with the improvement in cough in most cases, but it had no relationship to the changes in the red cell counts. For instance, in all the cases in which the sedimentation rate was lowered the red cells were increased. In case no. 4 which showed an increase of 9 mm. the red cell count was raised by 1,700,000 cells per c.mm. and in case 11 the red cells were increased by 1,200,000, although the sedimentation rate went up by 50 mm.

Whether the reduction in the sedimentation rate is due entirely to the beneficial effects of vitamin C, we are not in a position to give our definite opinion. The present work was started in the second week of August when the maximum temperature in Lahore is often above 110°F., and by the beginning of October it had fallen by 10° to 15°. It is therefore difficult to rule out the influence of external temperature on the sedimentation rate in these cases.

Of the three cases out of 20 with past histories of hæmoptysis two developed it again during the course of vitamin-C treatment. In both patients vitamin-C injections failed to control the hæmorrhage, one left the hospital

of her own accord and the other responded to artificial pneumothorax.

As regards anatomical changes in the lungs, as judged by clinical examination and x-ray, no appreciable change was detected in any of the cases.

Conclusions

Although we feel that the number of cases investigated by us is too small to form any definite opinion about the value of vitamin C in pulmonary tuberculosis, the observations as recorded above may be of some value in stimulating further research in this country. In a disease like tuberculosis for which we possess no specific remedy, more than one therapeutic agent is usually necessary. Vitamin C is far from a specific remedy in this disease, but from the impression formed from a limited number of cases observed by us we are of opinion that—

- (1) Vitamin C is a valuable adjuvant to other forms of treatment in pulmonary tuberculosis where it is deficient.
- (2) Its therapeutic value is most marked when there is co-existing secondary anaemia.
- (3) Vitamin C has little effect on appetite although the weight is favourably influenced in the majority of cases. The cough is lessened in nearly half the cases but the expectoration is not influenced much.
- (4) The sedimentation rate is lowered in more than half the cases.
- (5) The temperature and physical signs in the lungs are not influenced.

Our thanks are due to Mr. B. D. Kochhar, M.Sc., chemist in the department of pharmacology and therapeutics, K. E. Medical College, Lahore, for testing vitamin C in the urine, and to Col. G. G. Jolly, C.I.E., V.H.S., I.M.S., Inspector-General of Civil Hospitals, Punjab, for permission to publish this paper.

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EVOLUTION OF GOLD THERAPY IN PHTHISIS

PART I

By S. K. DAS, M.B.

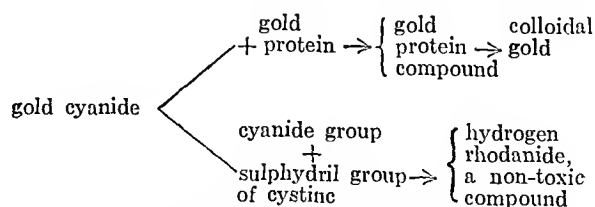
Visiting Physician, Islamia Hospital, Calcutta

The promising results obtained from the use of gold in the treatment of tuberculosis by different observers should give an impetus to the desire for further knowledge on the subject.

The actual date of its first application might be traced centuries back. Hopes and disappointments have come in their way, but the world-wide search for a cure for tuberculosis has gone on through the centuries.

Gold salts came into use many centuries before Christ, for in ancient Hindu medicine the preparation 'Makaradhwaja' was supposed to be a specific against tuberculosis and various (almost all) other diseases. Abu Moussa the Wise recommended the use of gold as a cure for all diseases. His findings can be traced back to the eighth century A.D. But it was not until about 1500 A.D. that we find it used as a specific for tuberculosis, when Paracelsus, the alchemist and chemist, used a compound of gold and mercury and called it the 'elixir of life'. Unfortunately, his experiments met with disasters and its use was dropped for a long time, and it seems that scientists gave up the idea altogether for a time. It was not until over three hundred years later that the therapy was revived by Chrestien (White, 1894).

It was about this time that a real advancement was made towards the therapeutic effects of gold when Robert Koch (1890) reported his valuable laboratory findings, and began his experiments with the cyanide of gold. His laboratory findings were very encouraging and he showed that a dilution of 1 in 3,000,000 of gold cyanide was enough completely to inhibit the growth of tubercle bacilli. He carried on his experiments on animals but found that in the animal body the salt was useless. An explanation to this fact was not possible till 1915 when Shumacher published an article proving that gold cyanide would dissociate at once in the animal body in the following way :—



The free gold ions and the cyanide group would inhibit the growth of tubercle bacilli in the test tube.

Returning to our chronological table we find that in 1891 J. B. White for the first time reported successes from the use of a complex compound of a double chloride of gold and sodium combined with manganese iodide. This treatment was a success as could be judged by

the facts that it (1) prolonged animal life including that of human beings, (2) improved appetite, (3) produced a distinct gain in weight, (4) diminished cough and sputum, (5) helped absorption of abnormal deposits, as evidenced by the disappearance of râles, and (6) improved blood conditions.

These and various other improvements, notably that of Gibbes and Shurley, who carried out a combined iodine treatment with gold, gave an impetus for further research on the subject.

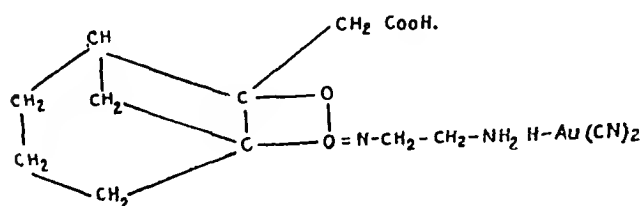
Between 1912-1915 extensive researches were carried on by German workers some of whom reported favourable results with gold potassium cyanide, notably in skin tuberculosis. Some of them contended that the fatty envelope of the tubercle bacilli was difficult to penetrate and a solvent for the sheath might give good results, and they tried chemicals like borholin for the purpose. In 1917 Oberstadt reported favourable results, but no case of complete recovery, if gold was combined with tuberculin.

Favourable results were also obtained by Bettman and Junker both in pulmonary and skin tuberculosis.

A further step was made when Bruck and Glück in 1913 after a series of unsuccessful experiments suggested intravenous administration, and Rosenthal (1913) claimed good results by the injection of tricyanide of gold directly into the diseased area.

Success was claimed in skin tuberculosis with gold potassium cyanide by Poor and Geber.

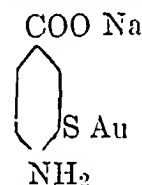
Further researches were carried out on the subject between 1912-1916 by Shies and Feldt, who began experiments with both gold cyanide and gold potassium cyanide. They totally denied all claims of success from the use of these products and thought that a drug of such high toxicity should not be used in animal experiments. They argued that if gold could be combined with some substance that might have some affinity for tubercle bacilli the drug might be used in concentrations that were harmless to the human body. They tried cantharidine which, if it could be made less toxic and yet easily compoundable with gold, would serve their purpose. They detoxicated cantharidine by combining it with ethylenediamine and found that it was compoundable with the cyanide of auric salts. But they found that the product was much less efficacious, so they replaced the auric by an aurous salt and found that it was 100 to 1,000 times more efficacious. The result was mono-cantharidyl-ethylene-diamine-aurous cyanide, which they called 'Auro-cantan'. The formula was



This product was a great success; it was supposed to act both by a direct action on the tubercle bacilli as well as by increasing the defensive mechanism of the body. Post-mortem study in experimental animals, where intravenous administration was possible, showed that lesions tended to be more productive in character and tubercles tended to disappear. Clinically, life was prolonged and there was distinct gain in weight. Failure in long-continued subcutaneous administration was supposed to be due to tissue necrosis and development of gold tolerance of the tubercle bacilli which was proved by finding that, after one and a half months, the bacilli would grow and thrive in 1 in 400,000 solution of gold cyanide in agar, whereas to start with they would not grow in 1 in 2,000,000.

Paul Ehrlich showed that the inorganic salts were less useful and more toxic and so he suggested organic gold therapy by combining gold with carbon which however was not a practically stable compound.

Further improvement, notably that of Feldt, was made; he recommended a product called 'Krysolgan' which is the sodium salt of p-amino-o-aur-phenol-carbonic acid, having the



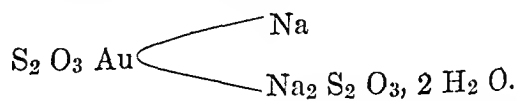
formula and whose action was favourable and comparable to tuberculin.

Reviewing the progress of gold therapy which went on for centuries, we should stamp the researches of Möllgaard as a distinct advance. In 1924 he published a paper in which he described his search for an ideal preparation that would be (1) bactericidal to tubercle bacilli, (2) highly soluble in water, (3) readily diffusible through the body tissues, and (4) without any toxic effect, especially on the liver and the kidneys.

This was crowned with success when he produced a gold salt with sodium thiosulphate having the formula :—



This he called 'Sanocrysin'. This salt is almost identical with another product that was discovered by two French chemists, Fordos and Gelis, in 1846. It has two molecules of water more than in the former preparation. The formula might be given as

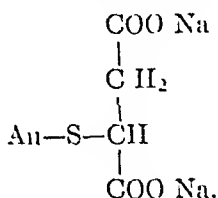


and this they called 'Crisalbine'; on analysis it yielded 37 per cent of gold and 24 per cent of

sulphur. 'Crisalbine' is available in India and is manufactured in England. It satisfies all the conditions required of such a preparation, if judiciously administered.

The difficulties connected with this preparation are that it has to be administered intravenously and so might be unsuitable for administration in young children and in those with not very prominent veins. Moreover, some people do not like to administer heavy metals by the intravenous route and prefer preparations that can be administered intramuscularly.

A solution to this problem was found in the preparation Myocrisin which is sodium thiomalate of gold having the formula:



It contains 50 per cent of gold.

Experiments with 'auro-etu-chloride' having proved bacterio-inhibitory power *in vitro* has now reached the stage of clinical trial where it has proved to be well tolerated in patients and is sufficiently encouraging in results to justify a more extended trial' (Twenty-fourth annual report of the King Edward VII Welsh National Memorial Association, 1936).

We can thus in brief conclude our history of gold therapy up to date and pass on to other details.

Mode of action

Gold has no specific action on tuberculosis alone since any inflamed connective tissue has the power to fix gold salts (Henius) and the action on tuberculous granulation tissue is similar to this. Schröder points out that every inflamed tissue reacts similarly to gold salts.

In the course of our discussion we have explained how scientists have tried to find a specific for tuberculosis. Gold has been described as having a direct bactericidal action on tubercle bacilli. Gerlach, Koppenhöfer, Feldt and others have tried to prove a specific action on tubercle bacilli and some have been able to demonstrate by histological study and by spectroscopic examination the selective abundance of gold in tuberculous foci. Their argument has been that gold forms a soluble gold protein compound with the bacilli and thus kills them. But this claim has been disputed (Schröder) and no one has been able to show successfully that it can kill tubercle bacilli in the human body. This is borne out by its having no effect on any tuberculous lesions in the body except pulmonary ones (Wingfield).

The second explanation of the mode of action of this drug—as a general tonic to the whole system by improving appetite, diminishing cough

and sputum, and thus increasing weight and prolonging life—is unquestionable, but this also does not give us any true idea as to its real mode of action.

The best explanation that has been put forward is that it stimulates the cells of the reticulo-endothelial system, especially those in the endothelial lining of the capillaries and blood vessels, as occurs in non-specific protein therapy. These cells, stimulated by gold in colloidal form, are thrown into the circulation in large numbers and are arrested in the congested lung area where capillaries are in abundance and where circulation is sluggish. These cells permeate the walls of the capillaries and engulf the bacilli and the waste products, and also help fibrosis and indirectly calcification at a later stage. The action of gold on the endothelium is of a toxic nature (Heubner). Wells contradicts the theory as absurd but believes that its mode of action is similar to that of a 'catalyst' which helps autolysis of the tubercles and the effect on the tubercle bacilli is of an indirect nature. But gold in colloidal form has been demonstrated as having penetrated the cells of the reticulo-endothelial system and the latter have been seen to have engulfed the mycobacteria, cell debris, and waste products.

It has also been pointed out by Feldt and Schott, Kirtschewsky and others that the mesenchymal cells as well as the fibrous components are stimulated into activity by the catalysing agency of the gold salts, which can be demonstrated in a histological section. So, we can state that the most modern idea about the action of gold on tuberculosis is that it is of the nature of a catalyst which, by liberating the cells of the reticulo-endothelial system and the mesenchymal fibrous tissues, sets the defensive mechanism of the body into action and also accelerates the spontaneous healing process (Feldt).

Rationale of the use of gold salts.—Koch and various other investigators found very little beneficial effects, if any, with the use of gold salts in tuberculous animals.

Pekanovich and Hauck (1913-14) stamped it as a dangerous drug as it caused (1) a severe hæmorrhage, (2) anæmia and (3) hæmolytic jaundice.

Galpe experimented upon cats and dogs, and described its toxic effects on the capillaries as it caused hæmorrhage into the lung alveoli within a few minutes.

Feldt pointed out that the bacilli developed tolerance to gold salts *in vitro* and so they could not produce any good effect, but this has been contradicted by Shiga (1916) and Wells, deWitt and Long (1923) in their experiments stated that the development of tolerance was so slow that it could not materially hamper the treatment.

Whether gold can stimulate the activity of tubercle bacilli in concentration less than is

sufficient for their destruction is a controversial point and many people have described it as a double-edged sword. Gold cyanides and cantharidyl-ethylene-diamine-aurous-cyanide, recommended by Spiess and Feldt, were tried with controls, and life was found to be cut short and the disease increased. It has been contended that tubercle bacilli have been found to thrive in organs such as the lung, spleen, liver and kidney which have been impregnated with a lethal dose of gold and the explanation has been given as follows:—

- (1) This gold salt on entering the body dissociates into gold and the acid radical. The gold ion combines into a gold-protein compound and is found in a colloidal state which is without any action against tubercle bacilli. This explanation is contrary to what Feldt showed—colloidal-gold-asparagin compound is inhibitory to the growth of tubercle bacilli and is almost equivalent to gold tricyanide.
- (2) The bacilli might be located in strategic positions that are not accessible to gold. This seems ridiculous as the bacilli must get nutrition and any imaginary crypts and crevices seem unlikely.
- (3) The cell membrane might act as a protective shield to the organism; this is also open to question.
- (4) The old controversial question of gold tolerance might be a factor.

Sanoerysin was described as a drug the value of which as a specific for pulmonary tuberculosis was undoubted, but as regards its by-effects it was stated that the drug, if used in the proper way, and in proper dosage was without any ill effects in the non-tuberculous subject, but in the tuberculous subject and when a correct dose has not been given it would be attended with severe toxic effects which would be manifest in the following symptoms:— (a) shock and collapse, (b) dyspnoea and cyanosis, (c) pyrexia, (d) toxic nephritis, which was proteotoxic in nature and not due to heavy-metal poisoning, as in that case the non-tuberculous subject's kidney would not have been exempt.

This is not a reasonable idea as the direct action of the drug on tubercle bacilli has never been established, because in that case the extra-pulmonary lesions would have been equally benefited.

Extensive trials with the first batch of drugs were carried out and the results have been too appalling to quote. 'The only conclusion that could be drawn from this trial was that Sanoerysin was a dangerous and highly poisonous drug which certainly had some direct action on pulmonary tubercular lesions' (Wingfield).

Some people in London and others elsewhere thought that the drug was directly bactericidal

and by killing the bacilli much toxin was thrown into the circulation; so they tried an antitoxic serum which would counteract the ill effects, but this serum proved worse than useless. This again we can attribute to a wrong selection of cases and indiscriminate use of haphazard dosage.

Reports from careful observers, notably those of Gravessen in Denmark and Heaf in England, speak very highly of the therapy and in their opinion two things are of the greatest importance, namely, choice of case and proper dosage.

In their opinion the drug has no effect on the proliferative or fibro-caseous types of tuberculosis, but if the body resistance be good early exudative types tend rapidly to clear up.

Gravessen showed with x-ray a record of successful cases where early exudative lesions disappeared with gold therapy. Jacqueroed showed that the same results could be obtained with prolonged sanatorium treatment alone.

Morland and Wingfield established the fact that, with proper individualization of dosage, it was a harmless drug or at least by no means alarming, but perpetual vigilance is required in the course of its administration. Their experiments with some of the more advanced types of cases, where the lesions were fibro-caseous or semi-productive in nature, proved to be unexpectedly successful. Out of 30 cases 17 showed striking improvement.

The effect of gold on early soft infiltration has uniformly found favour with authorities all over the world: Möllgaard and Gravessen in Denmark, Heaf in England, J. Zinkernagel and G. Schröder in Germany, Fordos, Gelis and P. Ameuille in France. Oberstadt in America, Shiga and Somogyi in Japan, Lenard in Hungary, M. Lucchesi in Italy, are among those who have had good results.

Personal experience.—Das (1936) published good reports on a batch of cases with their x-ray findings, and he considers that, if we can make a proper selection of cases and if the dose be graduated according to age, body weight, and general condition, if proper distinction between Europeans and Indians, males and females, and the types of lesion (perhaps the all-important factor) is made, and keen observation kept on the progress of the disease, if the results are checked from time to time by x-ray examination, if proper attention is paid to improving general condition by feeding and personal hygiene, improving general hygienic surroundings including the disposal of sputum (the patient being told not to swallow the sputum and not to spit indiscriminately), to sanatorium principles of exercise, care-free rest to body, mind, and voice, etc., and if in women stress and strain of life and child bearing in particular be carefully avoided, there is no reason for failure of this form of therapy. In fact, my experience with the drug has been

uniformly encouraging and no disasters have occurred so far.

Pharmacology.—Sodium thiosulphate of gold (Crisalbine) is an organic salt whose chemical composition has already been referred to. It is in the form of silky white crystals, readily soluble in water forming a clear, transparent neutral solution. On analysis it yields 37 per cent of gold and 24 per cent of sulphur. When dry, it forms a very stable preparation, but in solution or when moist it will not keep for long. Given intravenously in a solution that is isotonic with the blood serum (4.5 and 5 per cent), it is an ideal preparation as it satisfies all the conditions required of such a preparation: to repeat—(1) it is readily soluble in water, (2) readily diffusible into the tissues, (3) does not produce any toxic effect if judiciously given, and (4) is claimed to be bactericidal to tubercle bacilli.

Intravenous administration of Crisalbine being imperative another equally efficient preparation for the intramuscular route was tried and we find a very satisfactory preparation in Myocrisin.

Myocrisin is available in two forms—one the water-soluble form for injection intramuscularly in aqueous solution and the other in oil—the latter I prefer. The salt occurs in fine pale-yellow crystals—readily soluble in water and is very stable. The oily preparation is a thick milky-white substance which may stick to the glass of the ampoule but it has been provided with glass beads and on moderate shaking or warming a homogeneous suspension is formed which is easy to inject intramuscularly and the operation is painless. Both these varieties have a constant gold content and yield 50 per cent of gold.

Though some people prefer the ordinary variety on account of the ease of administration of the aqueous solution, the advantages of the oily preparation over the aqueous solution (though still there are many advocates of the latter) may be summarized as follows: (1) it is painless, (2) local reactions are minimized, (3) slow and uniform absorption takes place and so less toxic by-effects are produced, and (4)—a doubtful point—but I have always noted that after oily injections the patients get fat.

After injection the gold is slowly and partly eliminated, mostly through the kidney and the other part is fixed in various organs of the body from which depôts also it is slowly eliminated.

With the increase in the dosage, the percentage of elimination is also increased from 15 to even 50 per cent. Most of the elimination occurs during the first two days.

A detailed study of the distribution of gold in the body after Aurocantan administration has been made by deWitt, Cadwell and Leavell in guinea-pigs and the readings will be found of interest.

(Continued at foot of next column)

IONISABLE IRON IN CERTAIN INDIAN FOOD-STUFFS AND IN STUDENTS' DIETARIES

By K. L. ROY

J. C. PAL

and

B. C. GUHA

(From the University College of Science, Calcutta, and the Indian Institute for Medical Research, Calcutta)

In a series of papers published earlier, the nutritive values of Indian food-stuffs and dietaries with reference to their vitamin contents, protein values and their values regarding the physiologically important minerals, like calcium,

(Continued from previous column)		
Distribution of gold (post mortem)		Total amount
Milligramme of gold received	..	13.34
Percentage of gold excreted	..	40.82
" " " in the organs	..	9.527
" " " " " body	..	26.13
Milligramme found in the liver	..	0.447
" " " " " spleen	..	0.127
" " " " " lungs	..	0.071
" " " " " kidneys	..	0.12
" " " " " lymph glands	..	0.053
Milligramme found in the skin	..	0.45
" " " " " intestines	..	0.26
" " " " " blood	..	0.069
" " " " " body	..	4.08
Distribution of gold (in health)		
Gold per gramme of liver	..	0.0212
" " " " " spleen	..	0.0916
" " " " " lungs	..	0.0105
" " " " " kidneys	..	0.0263
" " " " " lymph glands	..	0.0246
" " " " " heart	..	0.009
" " " " " blood	..	0.006
" " " " " skin	..	0.027
" " " " " intestines	..	0.0075
" " " " " body	..	0.012

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phosphorus, and iron, were investigated (Chakravorty, Mookerjee and Guha, 1933; Ghosh, Chakravorty and Guha, 1933; Ghosh and Guha, 1933; Ghosh and Guha, 1934; Ghosh and Guha, 1935; Guha, 1934; Guha and Chakravorty, 1933). These investigations revealed certain deficiencies of Indian diets in protein, in certain vitamins and in calcium and phosphorus. A study of certain cooked diets obtained from middle-class students' hostels in Calcutta (Pal and Guha, 1937) showed, however, that while there may be an appreciable deficiency in calcium, the consumption of iron seemed to be more than optimum. It was suspected, however, that most of the iron was present in an assimilable condition and was not therefore significant from the nutritional point of view. Within recent years the distinction between ionisable (assimilable) iron and total iron in food-stuffs has received special attention and investigations in this line have been carried out in numerous laboratories. The planning of a dietary should obviously be based on the supply of the ionisable iron and not merely on the basis of the total iron content. For this purpose information is necessary about (1) the ionisable iron content of individual food-stuffs and (2) the ionisable iron content of the diets, as actually consumed. The ionisable iron content of Indian food-stuffs has

changes in nutritional value during the process of cooking. We, therefore, undertook a systematic nutritional investigation of cooked dietaries in varied aspects, and in this paper the ionisable and total iron contents of some of the cooked dietaries consumed in eight students' hostels in Calcutta have been reported.

Methods.—The ionisable iron was estimated by R. Hill's aa'-dipyridyl method (Hill, 1930; Shackleton and McCance, 1936) and the total iron by the method previously described (Pal and Guha, 1937). To test the accuracy of the dipyridyl method for such materials, known amounts of iron were added to the biological material in a few cases and it was found that these could be estimated with a fair degree of accuracy, results being usually correct within 96 to 100 per cent.

Figures for the ionisable and total iron content of 16 raw plant food-stuffs are given in table I. In table II the ionisable iron (I.I.) and total iron (T.I.) contents of the cooked diets consumed by an average adult on eight consecutive days in each of eight students' hostels in Calcutta are shown. In this work an aliquot of the total mixed diet was analysed as was done in earlier work (Guha, 1934). These diets were investigated in the months of September, October, November and December 1937.

Ionisable and total iron content of 16 raw plant food-stuffs

TABLE I

Bengali name	English name	Scientific name	Ionisable iron (in mg.) per 100 g. of fresh food-stuff	Total iron (in mg.) per 100 g. of fresh food-stuff
1. Uchchhe	Bitter gourd (small)	<i>Momordica muricata</i>	0.32	3.25
2. Gajar	Carrot	<i>Daucus carota</i>	0.16	5.11
3. Aloo	Potato	<i>Solanum tuberosum</i>	1.15	1.16
4. Mula	Radish	<i>Raphanus sativus</i>	0.21	1.66
5. Patal	Patal	<i>Trichosanthes dioica</i>	0.15	1.34
6. Karala	Bitter gourd (large)	<i>Momordica muricata</i>	0.19	1.28
7. Jhinge	Sponge gourd	<i>Luffa acutangula</i>	0.08	0.77
8. Mocha	Plantain flower	<i>Spille of Musa sapientum</i>	0.18	1.41
9. Fulkopi	Cauliflower	<i>Brassica oleracea</i> , var. <i>Botrytis</i>	0.50	0.90
10. Barbati	String bean	<i>Vigna catjang</i>	0.25	1.00
11. Pepe	Papaw	<i>Carica papaya</i>	1.20	1.25
12. Chhim	Bengali bean	<i>Dolichos lablab</i>	0.25	1.55
13. Shalgom	Turnip	<i>Brassica campestris</i>	0.13	0.95
14. Mishti-kumro	Sweet gourd	<i>Cucurbita maxima</i>	0.50	1.15
15. Chal-kumro	White gourd	<i>Benincasacriapora</i>	0.25	0.50
16. French bean	French bean	<i>Phaseolus vulgaris</i>	0.45	1.22

been estimated in several laboratories in India and, in view of the differences which even the same vegetable exhibits depending perhaps on variety, soil and season, it seems desirable to have as many data as possible even on the same food-stuff in different laboratories. We have reported some results obtained with individual raw food-stuffs in this paper. But nutritional investigations with cooked diets are relatively scarce both in this and other countries, though they seem to be very desirable considering the raw food-stuffs suffer considerable

A statistical note on the significance of these figures is given by Mr. K. C. Basak.

For this statistical analysis the values for the ionisable iron content are considered. The grand mean for all the hostels and for all the days works out as 7.14 mg. of ionisable iron per head per day. It is necessary to test if the means obtained for different hostels differ significantly from the grand mean. The results obtained by analysing the above data (table II) by Fisher's (1936) method of analysis of variance are given in table III.

TABLE II
Ionisable iron (I.I.) and total iron (T.I.) consumption in mg. per head, per day

Day	Hostel 1		Hostel 2		Hostel 3		Hostel 4		Hostel 5		Hostel 6		Hostel 7		Hostel 8	
	I.I.	T.I.	I.I.	T.I.	I.I.	T.I.	I.I.	T.I.	I.I.	T.I.	I.I.	T.I.	I.I.	T.I.	I.I.	T.I.
1	7.18	31.0	8.65	35.0	6.79	36.5	3.72	31.0	6.08	31.0	9.92	43.0	9.01	47.0	6.08	34.0
2	8.27	37.2	8.28	31.0	7.62	36.0	9.12	31.3	9.47	38.0	7.72	38.5	8.00	37.6	9.14	39.0
3	7.33	39.0	8.67	39.5	8.17	43.0	8.1	42.5	8.25	36.0	8.71	37.0	10.33	41.5	7.29	39.0
4	3.61	31.0	6.63	37.8	6.17	37.5	6.91	32.0	5.9	37.2	6.08	39.5	9.14	39.0	6.54	39.3
5	6.06	33.0	6.55	37.0	1.81	31.0	5.37	30.0	5.77	31.0	5.6	36.0	6.14	38.0	6.01	36.8
6	6.91	37.0	8.91	38.0	6.31	32.0	8.78	36.0	5.61	31.5	7.19	40.0	8.32	40.0	7.65	40.0
7	7.17	39.5	6.16	33.6	5.96	37.0	6.88	33.0	8.17	38.0	7.58	39.5	6.74	38.0	6.0	33.0
8	6.21	38.5	7.5	32.0	6.02	37.0	6.62	38.5	6.42	34.0	7.62	32.0	6.12	37.0	5.96	39.0
Average	6.59	36.12	7.80	36.2	6.56	36.2	6.97	31.6	6.96	34.9	7.51	38.1	7.97	39.7	6.83	37.5
PERCENTAGE OF IONISABLE IRON	18.2		21.5		18.1		20.1		19.9		19.7		20.0		18.2	

Thus, the mean ionisable iron content of the daily diet per head for all the hostels and all the days = 7.14 mg

TABLE III
Showing the result of analysis of variance

Source of variation	Degrees of freedom	Sum of squares	Mean square	Ratio
Between hostels	7	15.8075	2.2582	1.193
Within "	56	105.9989	1.8928	..
Total	63	121.8064	1.9334	..

The ratio is not significant according to the table of Snedecor (1934).

Hence the mean ionisable iron content of the daily diets does not appear to vary significantly from hostel to hostel.

We can assume that the amount of ionisable iron is distributed normally with

$$\begin{aligned}\text{mean} &= 7.14 \\ \text{variance} &= 1.9334 \\ \text{standard dev.} &= 1.3904\end{aligned}$$

Then for a period of eight days the mean should lie in nearly 95 per cent cases

$$\text{between } 7.14 \pm 2 \times 1.3904 / \sqrt{8} (= 0.9742) \\ \text{i.e., between 8.11 and 6.17.}$$

It will be noticed that all the observed means lie within this range.

Discussion and summary

The figures for the ionisable iron content of the plant food-stuffs show that although most of them are fairly good sources of total iron, the ionisable (assimilable) iron content is only a small fraction of the total iron in all cases, except the potato of which the ionisable and total iron contents are comparable. Among the others, although the total iron content of carrot

is quite high, its ionisable iron content is less than 1/30th of its total iron, which affords an example of the great disproportion between total and available iron in many food-stuffs. Among the vegetables studied the potato seems to be a particularly good source of ionisable iron and then come *uchchhe* (*Momordica muricata*) and radish in order of quality.

The investigation of the cooked diets consumed in eight adult students' hostels in Calcutta indicate that the average consumption of ionisable iron per day per head is in the region of 7 mg. Statistical analysis of the data shows that this value is significant, as the variations from hostel to hostel are not great. Considering that the optimum ionisable iron intake is usually put down as 10 mg. or above, it would appear that there is an appreciable deficiency in the ionisable iron intake in the average students' hostel in Calcutta. It would seem, therefore, that these diets should be re-inforced by a greater proportion of food-stuffs, which contain a relatively larger amount of ionisable iron, as determined in this and other laboratories. Several variations in the diet should, of course, be considered in this connection and studies of the diets in different seasons are now in progress, so as to get a representative idea of the diet throughout the year.

Our best thanks are due to the Students' Welfare Committee of Calcutta University, without whose financial assistance this work would not have been carried out. Our thanks are also due to Dr. A. N. Chatterjee, Secretary of the Committee, who has helped us in every way in carrying out this work. The superintendents of the hostels have kindly co-operated with us by supplying diets regularly for this investigation.

(Continued at foot of next page)

ARRHENOBLASTOMA

By M. N. SARKAR, B.A., M.B., F.R.C.S.E., M.C.O.G. (Lond.)
Professor of Clinical Midwifery and Obstetrics,
Medical College, Calcutta

and

B. P. TRIBEDI, M.B. (Cal.), D.B. (Lond.)
Professor of Pathology and Bacteriology, Medical
College, Calcutta, and Bacteriologist to the Government
of Bengal

THE ovary and the testis have the same mesenchymal origin and hence any remnants of the embryological rests of testicular structure in the ovary might proliferate and produce a neoplasm which might cause biological disturbances.

In the case of arrhenoblastoma of the ovary, we have a typical example of the above concept, where potential testicular cells present in the rete ovarii are developed, and through their hormone effects counter-balance the feminine characteristics, and produce male manifestations in a female.

The first description of this type of ovarian neoplasm was given by Pick (1905) who observed testicular seminiferous tubular structure in an ovarian tumour and gave the tumour the name of 'adenoma testiculare ovarii'. Meyer (1930) pointed out the probable histogenesis of this type of tumour and put forth the explanation of the sexual disturbances that are associated with this type of tumour. Novak and Long (1933), Novak and Gray (1936), and Schiller (1936), while discussing the nature of ovarian tumours, gave historical, clinical and histological descriptions of arrhenoblastoma which still remains as one of the uncommon variety of ovarian tumours. In view of the rarity of these we are describing a case which came under our observation recently.

(Continued from previous page)

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Mrs. A. C. M., Hindu, aged 18 years, wife of an educated man, was admitted into the hospital on 20th October, 1937, with the complaints that she had had no issue, and stoppage of her periods for twenty-two months.

History.—Menstruation started at the age of fourteen; the flow was excessive, lasting for eight days on the average. At the age of fifteen she was married, i.e., three years prior to her admission into the hospital. She was having the usual marital relationship with the husband. In January 1936, six months after her marriage, the menstrual flow stopped abruptly. Three months after the cessation of menstruation, she was examined by a doctor who gave the opinion that she was pregnant; the pregnancy, however, never materialized. Towards the end of 1936, she noticed that her voice was gradually becoming heavier and husky; her friends and relations also marked this change in her voice. For this change of the voice, which was attributed to the throat trouble, various treatments were tried but were of no avail. At this period she noticed growth of hair on her face, chest, abdominal wall and the legs which increased progressively. After this, she developed a dislike for the sexual act and she observed that the clitoris was getting bigger. From February 1937, she had noticed an abdominal tumour.

On examination.—A masculine type of healthy looking young girl; weight 118 pounds and measuring 5 feet 3 inches in height. Her scalp was covered with thick black coarse short hair. There was a conspicuous male type of distribution of hair over the face, neck, abdominal wall and pubis. The voice was husky and deep and the skin was dry. The breasts were very small and flat with prominent nipples. An abdominal tumour was felt growing from the pelvis reaching up to the level of the umbilicus, occupying the left lumbar, iliac and the left half of the hypogastric regions. The tumour was fairly mobile, felt hard and not tender; no evidence of any fluid in the peritoneal cavity.

The pelvis was small, the clitoris was hypertrophied, the prepuce being very prominent and like the circumcised penis of an eight-year-old boy. The vaginal canal and the uterus were normal; the tumour mass was felt to arise from the left side of the pelvis. The heart, lungs and other organs appeared normal. Blood pressure—105/65, urine was free. The blood picture showed an average normal count. The Wassermann reaction was negative. A skiagraph of the skull showed a normal sella turcica. A pre-operative diagnosis of left-sided cyst of the ovary or an arrhenoblastoma was made. She was operated on on 1st November. The tumour was found to be a left ovarian one, about the size of a no. 3 football, irregularly shaped. The mass was solid with a few softer areas on the surface. No area of degeneration was seen. The right ovary was small and smooth. Tubes and the uterus appeared normal. The patient made an uneventful recovery and was discharged from the hospital on the 12th November, 1938. The tumour, on histological examination, showed the following interesting picture:—

There were two distinct types of structural pattern, in one of which the tubular element with definite alveolar arrangement could be seen (plate XI, figure 1), whereas in others an atypical diffuse sarcoma-like appearance was quite apparent (plate XI, figure 2). Figure 3 shows both these two different types in one area. The intracellular substance was very loosely arranged within which definite gaps could frequently be found (plate XI, figure 2). Blood spaces, large and small, enclosed by indefinite ill-formed endothelial lining, were another conspicuous feature (plate XI, figure 4). The microscopical appearance was typically of an arrhenoblastoma.

After history.—The patient was examined on the 5th January, 1939, and the following were noted:—

She started her periods twenty-eight days after the operation; her voice became much softer and distinctly more feminine. Her breasts appeared normal with regard to the size and shape and had the usual soft feeling. The clitoris was still prominent but perceptibly



Fig. 1.—Photomicrograph (high power view) showing the typical glandular element of the tumour.
Ocular—8 × (Leitz).
Objective—8 (Leitz).

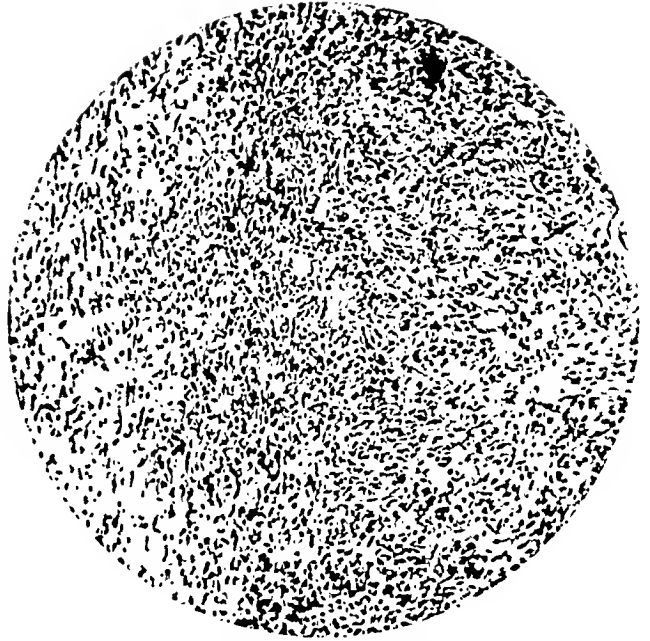


Fig. 2.—Photomicrograph (high power view) showing the diffuse sarcoma-like structure in the tumour.
Ocular—8 × (Leitz).
Objective—8 (Leitz).

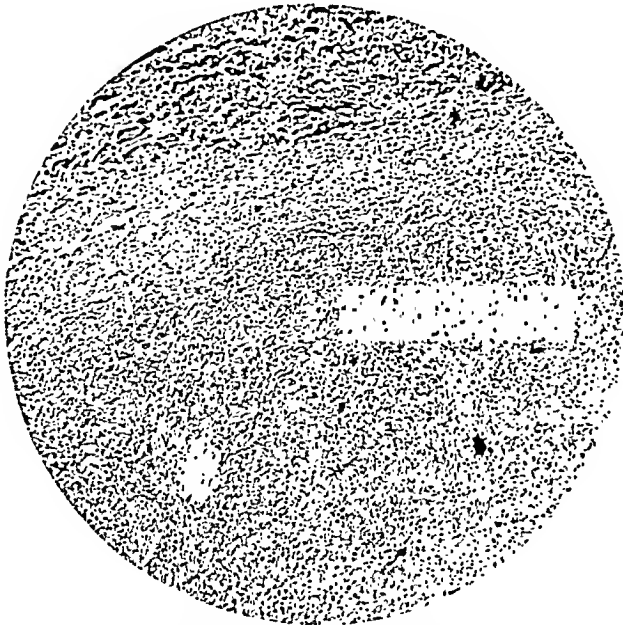


Fig. 3.—Photomicrograph (low power view) showing both the sarcoma-like structure and the glandular element in the same area.
Ocular—8 × (Leitz).
Objective—10 (Leitz).

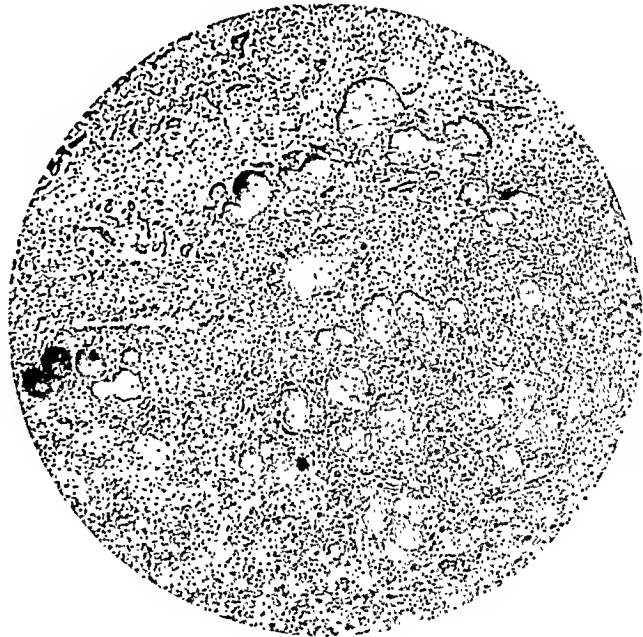


Fig. 4.—Photomicrograph (low power view) showing many blood spaces with endothelial lining.
Ocular—8 × (Leitz).
Objective—10 (Leitz).

much smaller than before. The masculine distribution of the hair had disappeared and the hair was found to be just as the ordinary female type over the pubis and in the axillae; the uterus was normal and menstruation occurred regularly every month but was accompanied by pain. Marital relationship was normal except there was a certain amount of pain accompanying the act. The patient was very anxious to become pregnant.

Comments

(1) *Clinical*.—From the marked biologic disturbances that this case presented, it is evident that this was one of those described as the extreme cases, i.e., both the defeminization and masculinization were conspicuous. Most of the masculine manifestations had disappeared and feminine characters were restored after the removal of the tumour, which is usual according to all the reported cases. Schiller (1936) pointed out that restoration of female type of voice was not observed because the laryngeal change cannot retrogress; in our case she distinctly improved so far as her masculine voice was concerned.

(2) *Histology*.—According to Meyer's contention, which seems to have the widest acceptance, a great deal of correlation exists between the histological picture of the tumour and the biologic disturbances. The tubular adenomatous type producing least whereas the atypical sarcoma-like tumours are responsible for the most marked changes. By studying a number of sections of the present case we find that different portions of the tumour were composed of different types of cellular pattern, as seen in plate XI, figures 1 and 2, but the portions showing typical tubular structures are not negligible, as would be expected from the pronounced biological disturbances that this case presented, a considerable amount of tubular structure being present throughout the tumour mass.

Conclusions

(1) A case of arrhenoblastoma is recorded.

(2) The clinical manifestations and the histological structure are discussed and the association of tubular structural pattern with the marked biologic disturbances are noted.

Our thanks are due to Dr. K. G. Banerjee, M.B., Suri, Bengal, through whom the case came under our observation, for helping us in following up the patient after her discharge from hospital.

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A SIMPLE MEANS OF PREVENTING SPIDER-LICK

By C. STRICKLAND, M.A., M.D.

Professor of Medical Entomology

and

D. N. ROY, M.D., D.T.M.

Assistant Professor of Medical Entomology, School of Tropical Medicine, Calcutta

IN some correspondence on the subject of 'spider-lick', Messrs. James Finlay & Co., Ltd., of Calcutta communicated to us the following passage from a letter that they had received from Mr. Jacobs, the factory manager at Riga Sugar Factory, near Muzaffarpur, in which he suggested that 'the liquid ejected by the insect . . . is soluble in water and may be washed off within an hour or two . . . and this removes its action'.

We gladly took the opportunity represented by a large collection of the insects that were forwarded from the same source to try out the hypothesis.

A powerful tincture prepared from the specimens and matured since May 1938 was used for the experiments on two volunteers. In each experiment approximately equal quantities of the fluid were used for it and for the control.

Experiment I.—In the first experiment both forearms of volunteer A were painted with the tincture. One hour afterwards the left forearm was washed in tap water. Two days after the right arm showed a marked dermatitis, while the left arm had a few rosary papules only.

Experiment II.—The left and right forearms of volunteer B were painted with the tincture by means of a camel-hair brush. His name was written with the paint and after his name a cross. One hour after the tincture had dried the left forearm was washed in running tap water, soap not being used.

The next day he noticed a slight reaction on the right forearm only.

The following day this had developed into a severe dermatitis showing confluent vesicles. On the other hand the left forearm showed a few isolated papules only.

Subsequently the left arm showed no more reaction than that.

Experiment III on volunteer A.—As the undiluted tincture had shown itself very severe in its reaction when the dermatitis was fully developed, the fluid was in this experiment diluted with 9 parts of rectified spirit before use. Washing the arm was done 2 hours afterward. The unwashed area developed a mild dermatitis, the papules being scattered, and the washed arm showed no reaction.

These few controlled observations thus confirm the observations made by Mr. Jacobs and indicate that attention to regularly bathing the parts that are not commonly covered with clothes should suffice to prevent the condition

arising. As the insects are nocturnal in habit, being, in their relation with man, strongly attracted by lights, it is essential that the sug-

gested attention to washing should be unrelaxed after dark, however little be given to it during daytime.

A Mirror of Hospital Practice

A CASE OF CEREBELLAR APOPLEXY

By F. R. W. K. ALLEN, M.A., D.M., M.A.O. (Dublin Univ.), M.C.O.G.

Superintendent, Robertson Medical School, Nagpur

G. L. SHARMA, D.M.

Lecturer in Pathology

and

I. B. BASU

Surgical Registrar, Mayo Hospital, Nagpur

THE following case of thrombosis in the posterior inferior cerebellar artery seems interesting enough to be placed on record:—

C., aged 35 years, Hindu male, was admitted into the hospital on the 10th August, 1938, with the following complaints:—

1. Inability to walk.
2. Difficulty in swallowing food and drink.
3. Difficulty in speaking clearly.
4. Dizziness.
5. Vomiting.

Family history:—Nothing important.

Personal history:—Addicted to alcohol and heavy smoking.

Past illness:—Contracted syphilis about 15 years back. Two years back he was admitted to this hospital for pain in the præcordium (angina pectoris?).

Present illness:—The patient drank country liquor in large quantities on the 7th August, 1938. He slept well in the night but the following morning he vomited a few times and was markedly dizzy. As there was a cholera epidemic in the city, he thought he was suffering from cholera and sent for a doctor, who prescribed him some mixture. The patient took two doses of this, but could not swallow the third dose which regurgitated. Soon after, he noticed that he could not stand. He fell down on his left side. The left upper and lower extremities appeared to be weaker than the right ones. His speech became thick.

General examination:—The patient looks strong and well built. His left eye looks smaller than the right. On standing his dizziness is increased and he loses balance.

Examination of nervous system:—Intellectual functions—Nothing abnormal.

Cranial nerves:—(1) Trigeminal nerve—There is analgesia and thermanæsthesia on the left of the face.

(2) Glossopharyngeal, vagus and accessory nerves—There is paralysis of the soft palate on the left side, and dysarthria. There is difficulty in deglutition.

Oculo-pupillary centre:—There is miosis and enophthalmos on the left side.

Motor functions:—Analgesia and thermanæsthesia on the right half of the trunk, right upper and lower limbs and left half of the face.

Reflexes:—Absent on the left side.

Plantar reflex:—Flexor on both sides.

Organic reflexes and sphincters:—Nothing abnormal.

Cardiovascular, respiratory and alimentary systems:—

Nothing abnormal detected. His blood pressure on the day of admission was 155/100 mm. of mercury.

Fundus oculi:—Normal.

Fluoroscopic examination of the heart and blood vessels:—Nothing abnormal found.

Laboratory findings:—Urine—Nothing abnormal.

Blood:—Wassermann reaction—Strongly positive.

Cerebro-spinal fluid colloidal gold test:—Luetic curve.

Treatment:—As he could not swallow any solids or fluids he was fed with milk poured down the stomach tube. Eutodon 2 c.cm. was given intramuscularly daily for 20 days. This was followed by tryparsamide intravenously, first dose being 0.1 gramme, and subsequent nine weekly doses of 0.3 gramme each. Casbis 1 c.cm. was administered intramuscularly thrice a week on 20 occasions.

He can now eat and drink normally. He walks about and does his business as a hair-oil manufacturer. His speech is clear. He has no dizziness. His blood pressure is 140/98 m.m. mercury.

AMELIA

By D. R. VAIDYA, M.B., B.S. (Madras)

Obstetric Registrar, Sassoon Hospital, Poona

THIS congenital deformity is very rare.

A woman, aged 32, was admitted into the maternity section of the Sassoon Hospital.

Obstetrical history:—4th para. All deliveries were normal.

On 16th February, 1938, she was delivered normally of a male child weighing seven pounds. The baby had no upper extremities; there is no other congenital mal-development and the child is thriving well.

An attempt was made by taking a skiagram to note whether there were any rudimentary arm bones. It shows no evidence of extremities and clavicles and scapulae are normally developed.



It was suggested that this may be a case of intra-uterine amputation but the absence of scars, or any sign of upper extremities dismisses this possibility.

There is no history of hereditary deformities in the families of the parents and grandparents.

Volume I, the *Practitioner's Library of Medicine and Surgery*, 1932, mentions this condition under the name of 'Amelia'. Another book which has described the condition is the *Encyclopædia of Medicine* under the name 'Abachia'.

Patient was discharged on 21st February, 1938.



My thanks are due to Lieut.-Col. R. H. Candy and Lieut.-Col. F. R. Thornton for allowing me to publish the case.

[Note.—Amelia strictly means the absence of all limbs so abrachia would be more correct, but the *British Encyclopædia of Medical Practice* uses ectromelia for absence of one or more limbs.—EDITOR, I. M. G.]

POSTERIOR BASAL MENINGITIS IN A CHILD

By D. A. GANGOLLI, L.C.P.S.

Medical Officer, In charge Dispensary, Bhayndar
(District, Thana)

A MALE child about a year and quarter old was brought to the dispensary on the morning of 4th July, 1938, for the treatment of high fever with unconsciousness for the last six days.

Previous history.—The child had been quite normal and healthy since its birth and on the evening of 28th June, 1938, it suddenly got high fever with vomiting, convulsions and epistaxis. Consciousness was soon lost and the child ceased feeding.

Condition on admission.—Temperature 104.2°F. Pulse 136 per minute, feeble and irregular. Child in an unconscious condition. Head markedly retracted

with stiff neck. Internal deviation of both the eyeballs, and the eyes widely open and staring. No photophobia. Both the upper and lower extremities spastic. Heart and lungs normal. Spleen and liver not palpable. No tuberculous focus could be detected anywhere in the body either in the lungs, glands or bones.

Treatment.—Lumbar puncture was decided upon but was refused by the parents, so only medicinal treatment was resorted to. Calomel grs ii was applied to the tongue mixed in honey and a diaphoretic mixture containing full doses of urotropine was given. Temperature came down to normal the same evening with profuse diaphoresis, and on the next morning consciousness was regained. For the next three days the diurnal range of temperature varied between 98°F. in the morning to 101.4°F. in the evening, after which it remained within normal limits. Convalescence now set in and the squint in the left eye gradually passed off while that in the right eye did not show any progress towards recovery. The stiffness in the upper limbs passed off while that in the lower limbs remained for a longer time. The child often-times lay on its back for hours together absolutely motionless without making the slightest attempt to move its lower limbs and it shrieked violently whenever an attempt was made to move them forcibly. Massage combined with passive movements together with hot baths gradually restored the power in both the lower extremities and the child appeared quite recovered. At this stage the treatment was abruptly terminated and nothing more of the child was heard till 28th December, 1938, when it was again brought into the dispensary. On inspection it was found that the child was perfectly normal except for the squint in the right eye which still persists and this defect, it seems, will remain permanently. The child keeps its face turned towards the right side and a peculiar form of torticollis is present. Diplopia is present as when an object like a lead pencil is held on the child's extreme right it tries to catch at an imaginary object away from the pencil while on the left side no such difficulty is experienced.

Comments.—A sporadic case of posterior basal meningitis in a child diagnosed clinically is described. This case is interesting on account of the following facts:—

1. The child recovered though no lumbar puncture was performed.

2. The child escaped from the most common complications of this disease which are described in the ordinary textbooks such as hydrocephalus, mental impairment and deafness, while it suffered from a most unusual complication of paralytic squint and diplopia in the right eye due to paralysis of the sixth cranial nerve and consequently of the lateral rectus muscle of the right eyeball. The abducent nerves are liable to be affected on one or both the sides simply by increased intra-cranial pressure, as in acute meningitis, due to the long course of the nerves in the cranial cavity, giving rise to squint in the eyes as seen in the case of the present child in the early stages. But when the acute stage passes off the pressure on the nerve trunks is relieved and the eyes recover. In the present case, it seems that in addition to the pressure on both the nerves there was an exudation of fibrinous material along the course of the nerve on the right side which not being completely absorbed was converted into fibro-cicatricial tissue causing permanent adhesions of the nerve trunk, leading to deformity and defective vision in the right eye.

ON A FOREIGN BODY INTRODUCED BY GUNSHOT

By K. B. CHAKERVERTY

Medical Officer, Ambootia Hospital, near Kursong

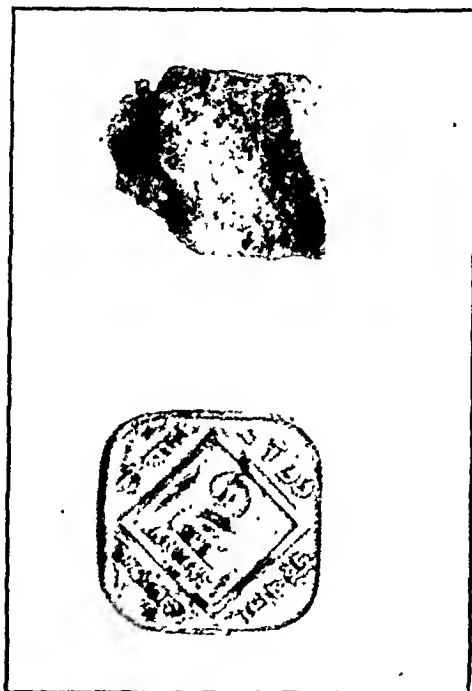
THE following account of a foreign body introduced by gunshot and lying quiescent in the tissues for 17 years may be of some general interest :—

A Nepali ex-sepoy, now aged 42, had a gunshot wound in the buttock in 1921, when he was on duty in the Moplah rebellion in Malabar.

The bullet was removed at the time, the wound gradually healed and after three months the patient was discharged as cured.

He subsequently retired from the service and came to Ambootia tea estate with other members of his family. From 1923 onwards he has worked on the tea garden without anything untoward except for slight discomfort when lying down on the old site of the wound, and occasionally pain after a long journey. Since 1925 he has worked as dispensary compounder.

On the 21st December, 1938, he suddenly developed acute inflammation with severe pain at the site of the wound, and fever which continued for about a week. The treatment given was the continuous application of a hot borie compress. The part soon suppurated



and made a point outward with a hard sharp edge which I suspected to be a necrosed bone. An incision was made to open the cavity and firmly holding the foreign body with forceps it was pulled out.

On examination it was found to be a broken piece of iron weighing about 148 grains (*see* photograph made against a 2-anna piece). The patient is now completely well and free from all the troubles that he so long experienced.

A *khookri* was hanging at his waist at the time of his gunshot wound, and it appears that a broken piece of the *khookri* gained entrance into the tissues with the bullet and, when the bullet was removed, the broken piece of the *khookri* was left behind unnoticed.

It is interesting that the patient should have carried on his work with such a comparatively large piece of iron in the tissues, and that it was

possible for it to remain there for so long (17 years) without any serious ill effects.

ERYSIPELAS IN A CHILD AGED 6 DAYS TREATED SUCCESSFULLY WITH PRONTOSIL RUBRUM (BAYER)

By SUDHIR CHANDRA ROY, B.Sc., M.B., D.T.M.

Kurigram, Rungpur

A FEMALE child, aged 6 days, was seen on the third day of her illness. She had erysipelas extending from the chin to the middle of right scapula on the back and nipple on the front of right side of chest. The child was very restless and her temperature was 106°F. The patch at first began on the back of the neck and spread rapidly.

Prontosil rubrum was given as:—

R Prontosil rubrum 1 tablet
Saccharum lactis gr. 20

Fiat. pulv.; divide it into 12 powders. Sig. one powder to be taken every 4 hours (four times daily).

Ichthyol, 30 per cent aqueous solution, was applied locally.

Next day the temperature came down to 102°F, and the spreading margin was arrested. On the sixth day of the disease the temperature came down to normal, but as the redness of skin was still present another tablet of prontosil was given as before. The child then recovered uneventfully.

Remarks

I am sending this report because it is interesting that such a young child was given prontosil successfully without showing untoward symptoms.

A RARE CAUSE OF SUDDEN DEATH

By D. P. LAMBERT, M.B., D.T.M. & H.

MAJOR, I.M.S.

Civil Surgeon, Meerut

EARLY in the morning on 12th January, 1939, a man of 65 uttered a cry and collapsed. Before any help could be brought he died. At post-mortem examination, eight hours later, both suprarenal glands were found enlarged, particularly in relation to the man's stature and physique, and there was a large recent hæmorrhage into the right suprarenal gland. The suprarenal arteries were tortuous and slightly thickened. There was similar tortuosity and slight thickening of the cerebral arteries and of the coronary arteries. The great vessels and the other peripheral arteries were normal. The left ventricle was hypertrophied, but the myocardium was healthy, and no other abnormality was present in the heart. There was moderate enlargement of the spleen probably malarial in origin. The liver showed early 'nutmeg' congestion, and there was a solitary pigment stone in the gall-bladder. The lungs showed fairly extensive healed tuberculosis at the apices, especially on the right side. All the other viscera, and in particular the kidneys, were normal.

Hæmorrhage into a suprarenal gland is one of the rare causes of sudden death. There is no ante-mortem record of this man's blood pressure, but it is almost certain that it was high. It is tempting to relate this to the hypertrophy of the suprarenal glands and to speculate whether Leriche's operation of unilateral supra-renalectomy might not have prolonged the man's life.

I am indebted to the Inspector-General of Civil Hospitals, United Provinces, for permission to publish this note.

Indian Medical Gazette

MAY

CHEMOTHERAPY IN PNEUMONIA

In our October issue of last year, whilst discussing the treatment of lobar pneumonia, we referred to the recent experimental work of Whitty who had selected a drug, 2-sulphanilyl-amino-pyridine, as being the most active drug so far tested in protecting mice against pneumococcal infections; we added that this drug had been used clinically with very promising results, and concluded with the following paragraph:— 'It is too soon to be jubilant about this particular compound, but we are certainly entitled to be optimistic regarding the future of chemotherapy in this disease. The very great advantage of the drugs of this group is that they are not expensive and it seems possible that herein lies the solution to the problem of the treatment of lobar pneumonia in this country'.

At the time this was written the only paper on the clinical use of this drug that had reached us was Evans and Gaisford's very convincing series of one hundred cases treated by 'M. & B. 693' (2-sulphanilyl-amino-pyridine) with 100 controls treated by the 'usual routine non-specific methods'. The results of this first important clinical trial were very striking; the death rate in the treated series was 8 per cent and in the controls 27 per cent, a very significant difference.

This first clinical report was soon followed by those of other workers in Great Britain who obtained equally good results, and this year a number of reports have been received from the colonies.

Anderson and Dowdeswell from Nairobi reported a trial in 50 cases with 50 controls: in the cases in which M. & B. 693 was used there was only one death and in the control series there were 8 deaths. From Johannesburg a very extensive series, consisting of over five hundred cases and controls, is reported: there were 10 deaths in a series of 266 cases treated by M. & B. 693 and 27 deaths in the control series of 257, death rates of 3.8 and 10.5 per cent.

In the Nairobi series the difference is not quite significant statistically, but in the Johannesburg series it is very significant, and if the latter series is analysed it is seen that the improvement in mortality figures is more marked in certain sections of the community, for example, in the Johannesburg hospital patients who are taken from the general community and include a higher proportion of old people. Another difference is that the labourers in the

mines are strong and healthy individuals who are under constant medical supervision and have been inoculated as a prophylactic measure; in this class the normal mortality rate is low and the improvement is not so marked.

The reduction in the death rate is the final criterion of the value of every drug, but from the practitioner's point of view the immediate effect on the symptoms of the disease is often of considerable importance, and M. & B. 693 is remarkable in its immediate effect, not only on the symptoms but on the pathological processes; it brings about a very rapid fall of temperature within 24 hours in a majority of cases and appears to stop the extension of consolidation.

In the Nairobi series the temperature fell to normal within 24 hours in 26 cases (52 per cent), within 48 hours in 44 cases and in every case within three days of the institution of specific treatment with M. & B. 693.

It is as yet too early for any final decision as to the optimum dosage to be arrived at, but the tendency at present is towards a slightly larger dosage than was at first used. Evans and Gaisford at first gave one tablet (0.5 gramme) every 4 hours but later increased this to two tablets (1 gramme). The procedure that is usually adopted now is to give an initial dose of 2 grammes and follow this by 1 gramme every four hours for the first 3 or 4 days, and then to give 1 gramme twice a day for a few more days. Too early discontinuance of treatment may lead to the extension of the pathological process to another lobe during the second week. The total dosage may thus amount to 36 grammes, but this is seldom necessary and the average total dose in the cases so far reported is not more than 25 grammes. In the Nairobi series the average was 18.5 grammes and in the various Johannesburg groups it was 31, 29, 24 and 14 grammes.

The ill effects of this therapy in certain cases are much the same as, though possibly less in frequency and seriousness than, those associated with other sulphanilamide preparations, and, in the treatment of a serious condition such as this, the slight risk fades to negligible proportions. However, the same precautions regarding the taking of sulphur-containing drugs and foods must be observed.

Elsewhere in this number will be found a paper reporting the results of the treatment of pneumonia by M. & B. 693 at Lahore.

The same very promising results have been obtained; in a series of 50 treated cases and 50 controls the death rates were 10 and 18 per cent respectively, but again the most striking effect of the treatment was the extremely rapid fall of temperature, in 39 cases out of 50 the temperature falling to normal within 48 hours. We have also received information regarding its use in an industrial community in India, where over a certain period last year the death rate amongst

the pneumonia cases was as high as 60 per cent: in a corresponding period this year only 3 deaths have occurred in a series of 48 cases.

In our previous editorial we mentioned that the drug was not expensive. Expense is necessarily a comparative term and at that time we were comparing the cost with that of the serum treatment of pneumonia. The high cost of serum treatment of pneumonia prohibited its extensive use in India and as serum is a biological product it is impossible to reduce its cost to

any important extent; but this does not apply in the case of synthetic preparations of the sulphanilamide group. Even at the present day the cost of the treatment of a single case is not high considering that it doubles the patient's chances of recovery. The time may not be far hence when this or some equally efficacious drug will be available at a price within the reach of India's masses, and the prophecy contained in the last sentence of our October editorial may be fulfilled sooner than we dared to hope.

Special Articles

PUBLIC HEALTH—THE FOUNDATION OF NATION BUILDING

(BROADCAST TALK by SIR A. H. RUSSELL, C.B.E., K.H.S., COLONEL, I.M.S., *Public Health Commissioner with the Government of India*)

MANY of you no doubt are acquainted with the Biblical story of the wise man who built his house upon a rock in contradistinction to the foolish one who built upon sand with disastrous results. Similarly in nation building, we must be sure of our foundations and it is my purpose to-night to try to demonstrate to my listeners that the one sure foundation on which to build a happy and prosperous nation is that of health, not only health of the individual but health of the community. We are all so apt to leave community health, or public health as it is usually called, to the other fellow, forgetting that it is the cumulative effort which counts so much. So it is that I have no hesitation in claiming that public health, and all that that phrase implies, is the sure foundation on which to erect the structure of national wealth. Without that foundation, no nation can hope to be strong enough to resist successfully the strain of economic and social storms.

The purpose of all nation-building activities is to make the life of every citizen fuller, richer and happier. This implies that the individual citizen should be provided with suitable opportunities for desirable self-expression, in respect of his physical, intellectual and emotional equipment, because only by that means can he hope to enlarge his experience and his capacity for enjoyment of life. Modern public health development stands for the creation and maintenance of all those conditions which will enable each individual to attain these objects. Sickness, pain and suffering, poverty, malnutrition, maladjustments in his home or in his work or in his social environment, these are largely responsible for depriving the average citizen of his inherent right to enjoy life. A well-organized public health campaign must take cognizance of all those deterrents to happiness and I for one believe that in the advance of public health we have the solution.

For many centuries past, human society has recognized the necessity for treatment and care of the sick, but the conception of prevention of disease and sickness by means of an active programme of ameliorative measures intended to render it possible for the people either to maintain health, or, at least, to live more healthy lives, is one of much more recent origin. In fact, it is not yet 100 years since in England the importance of preventive medicine came to be recognized and was made the foundation of the many-sided social and health services now in existence in that country.

But, you may ask, how does the public health worker seek to bring greater happiness to the individual and

to the community? It is by no means easy to summarize in a brief talk the many different directions in which health work should be planned, because it has become obvious—at least to those who have real vision—that preventive medicine includes in its range of activity 'the whole nature of man, as shaped by his home, his surroundings, his work, his recreation, his struggles and his aspirations'. This, as you will appreciate, is a formidable task, but, for my purpose to-night, it might perhaps be divided into four parts:—

(1) State-aided health services capable of providing care for every individual, from the pregnant woman and unborn child to the adult and the aged. These services would also include separate branches for special health problems, such as those associated with tuberculosis and leprosy.

(2) Improvement of environment by the provision of sanitary houses, fresh air, pure water and nourishing food, both for humans and cattle.

(3) Education of the people—especially the wives and mothers—in the principles of health so that the active co-operation of every individual may be obtained. The search for health demands the abandonment of many undesirable habits and the practice of others which science has shown to be necessary to man's well-being, but here perhaps we are faced with our greatest problem because 'all our life, so far as it has a definite form, is but a mass of habits', good, bad and indifferent and the inherent inertia of man always acts as a serious handicap to change.

(4) Promotion of physical and mental welfare with the object not only of increasing the resistance of the body to disease and of promoting happiness in bodily activities, but also of assisting the individual to secure harmonious development of his intellectual and emotional faculties.

Such a comprehensive programme must of necessity lay a heavy burden of expenditure on the State and, even in the wealthiest countries, it has been found impracticable to carry it out other than by successive stages, and, then only, as and when the necessary public funds become available. It is not sufficiently realized, however, that all social and economic progress is seriously hampered by sickness and a low level of physical fitness, and this is particularly true of India. Improvement of public health is essential if, for instance, the working capacity of the agricultural or industrial labourer is to be raised; and those acquainted with existing conditions in this country are only too well aware of the handicap to efficiency which is caused by bad health and poor physique. The fact that the deaths from malaria in British India alone total 1,250,000 yearly indicates the amount of suffering, incapacity for work and loss of income caused by this one disease, especially among the rural agricultural populations on whose productive capacity the prosperity of this country so very largely depends. Another striking illustration may be found in the large numbers of deaths among young mothers and their infants, and these, of course, represent only a small fraction

of the amount of ill health and suffering which is borne by the women of India. Whilst no estimate can be made of the economic loss these and other mortality figures represent, although it must extend to many crores of rupees each year, they certainly point to the necessity for progressive health work as the essential foundation for sound and secure nation building.

Another aspect of the economic question is that State action directed towards improvement of health has undoubtedly beneficial repercussions in many other directions. Take, for instance, the question of nutrition. During recent years, we have been able to obtain a more accurate picture of the amount of malnutrition from which the people of this country suffer, and it has also been shown that an adequate state of nutrition is of the greatest importance, not only in the prevention of disease but also in increasing man's resistance to infection and his sense of well-being. Solution of the nutritional problems in India, however, depends on improved agricultural and animal husbandry practices, the development of trade and industry, the encouragement of co-operative enterprise, banking and other activities. There is no shadow of doubt that every step towards better national health will lead to the development of all those activities which are so fundamental in any nation-building campaign.

Improvement of public health demands that every individual should develop a sense of responsibility in respect of his neighbour's welfare in addition to his own. It is not enough for the house-holder to keep his own restricted environment tidy and clean, if by doing so he creates afresh conditions favourable for the development of ill-health in his neighbour or in the community. Modern science has shown that, in matters relating to health, man is his own worst enemy and much of the disease which now works havoc over large areas could be avoided if the community sense were better developed and if the individual were brought to realize the danger of his own actions to community health.

The remedy for these errors, which are usually but not always the result of sheer ignorance, lies in health education, that is, in teaching the people how to avoid actions which assist in the spread of disease. Such instruction is essential for real citizenship, because it is only when the individual comes to realize that his interests and those of his neighbours are identical in respect of health matters that he develops the wider outlook which is so essential if his actions in other spheres of life are to be to the benefit of the State and to his fellow citizens.

The history of the public health movement in England and elsewhere clearly indicates that the initial stimulus towards necessary reform has repeatedly come from private individuals or from voluntary organizations. Whether it be in respect of factory legislation for the improvement of the conditions of factory workers, of measures for saving the lives of mothers and infants, of prevention of tuberculosis or of other efforts for alleviation of human suffering voluntary effort has led the way to State action in practically every civilized country. Even when Governments have assumed responsibility, there always remains room, however, for the resources in time, money and labour of humanitarian individuals and voluntary organizations in supplementing official activities. It has been remarked that 'to save and prolong man's life, there is nothing so effective in the long run as collective humanism'. There is no doubt that 'collective humanism' is a living force in this country, as the recent result of Her Excellency's appeal on behalf of the tuberculous sufferer has indicated, but the urge towards high human endeavour requires a much wider development if it is to meet adequately the heavy and urgent demands which must be obvious to all thinking men and women in this country. In so far as the public health movement can help to foster man's fellow feeling for man, its contribution towards nation building will be of an enduring and beneficent nature, resulting in a vastly desirable increase of human happiness and well-being.

BASIC PRINCIPLES OF SOLARIUM TREATMENT*

By P. M. MEHTA, M.D., M.S., F.C.P.S.

Director, Solarium, Jamnagar

Historical survey of ray therapy

RAY therapy means the treatment of diseases by solar radiations, as well as by those produced by artificial sources. The latter have come into being during the last few decades. The solar rays have been used by men since time immemorial. Even animals have been observed to expose their injuries to the rays of the sun. The men of the stone age selected their cave dwellings for their favourable situation for the admission of sunlight. In all ancient religions the worship of the sun finds a premier place. The Egyptians worshipped Ra which means the sun. Their kings were called Pha-ra-oh, i.e., the deputies of the Sun-God. From an ancient Egyptian picture, it appears that Egyptians took sun-baths. Heliotherapy, as such, was first practised by the Greeks. From them the practice was honoured by the Romans. They built sun houses which they called solaria. These were generally apartments made in dwelling houses for the purpose of sun-baths. Such solaria were also attached to the halls of the sick in hospitals. In India the therapeutic use of solar radiations seems to have been carried further than mere exposure in the interests of general health. There are clear references to cures of leprosy and skin diseases by exposure to the sun (*vide* Mayur's *Surya Shatak*). But we have no grounds to conclude that heliotherapy was systematically practised here. We may trace the history of ray therapy to these ancient practices, but strictly speaking they have no bearing on the subject. The present-day ray therapy cannot in any sense be said to have developed from them. The first seed of ray therapy was sown by Newton in 1666 when he discovered the spectrum. It was this discovery which later led to the discovery of invisible radiations and artificial production of rays. The seed was to begin bearing fruit two centuries later. During that period the science of light and electricity made great progress. The invisible infra-red and ultra-violet rays and the Hertzian waves were discovered. The progress in physics and science generally was a necessary condition precedent to the rise and growth of ray therapy. The knowledge of the ingredients of sunlight and the mechanical contrivances for production of radiations are the foundations on which it is based. Finsen and Rollier may be called the fathers and pioneers of ray therapy. Finsen showed that lupus was curable by ultra-violet radiation. He contributed much to the development of methods and technique. After him

*Being a paper read before the meeting of the Baroda Medical Union on the 9th August, 1938.

Rollier opened an institution in the Swiss Alps for the scientific use of heliotherapy. He had much success in the treatment of anæmia, chronic ulcers, and surgical tuberculosis, specially tuberculosis of the skin, bones, joints and glands. His extensive work following Finsen's, inspired many scientific investigations and applications of the present century. With Röntgen's discovery of x-rays in 1895 and the isolation of radium by the Curies in 1898, the present century was prepared for intense application of radiant energy in therapeutic practice.

During the last 25 years many new sources of ultra-violet, visible and infra-red rays have been developed.

Dr. Saidman of Paris designed the solarium mainly to utilize the sun's rays. The whole construction has been planned so as to make use of radiation, specially solar, in the most scientific way. He built the first solarium at Aix-les-Bains, Paris, where his late Highness Jam Sahib Ranjitsinhji happened to be treated. With his usual acuteness of observation he at once saw that the usefulness of a solarium in a sunny country like India would be much greater than in Paris where sunlight was not available so continually. He saw that the solarium if made in his State would not only be a boon to his subjects but to the whole of India, and he decided to build a solarium at Jamnagar. Unfortunately, he did not live to see it erected and working, but it stands as a permanent memorial to the greatness of that prince who always thought ahead of his times and whose work has proved to be of lasting benefit to his people and countrymen. Inspired by the same spirit, the present Jam Sahib carried to completion the construction of a solarium at Jamnagar. There are only three solaria in the world. This being the latest is the best equipped and most up to date.

Present status.—Solarium treatment means ray therapy. Ray therapy has not yet won the recognition of the universities. Without academic sanction the spread of a new system is necessarily slow. Quackery and exploitation of diseases for profit are so rampant that even a genuine and scientific innovation cannot escape the scepticism and suspicion, but sun-ray treatment is now generally accepted by the profession, whose interest in this subject is daily increasing.

Rationale.—In medicine and surgery we follow chemical and mechanical methods. These seem to be quite natural and adapted to the body whose actions are nothing but a series of chemical and mechanical processes. Ray therapy breaks new ground altogether. A dose of ultra-violet rays sounds strange, but it is as scientific as any other system of medicine. In fact it reflects in the therapeutic field the latest development in science.

Chemistry looks upon the atom as the smallest irreducible particle of an element. Physics has

carried the quest into the mystery of matter further and discovered in the atom a solar system on an unimaginable infinitesimal scale. Every atom is made up of electrons and protons. The electrons in the atom keep revolving round the protons just as the planets do round the sun. Some idea of this miniature solar system will be obtained when I tell you the size of an average atom to be one four hundred millionth of an inch, of an electron to be $3/20,000,000,000,000$ of an inch and of a proton $1/25,000,000,000,000$ of an inch. Small as the atom is it is still big enough to contain a solar system with sun and planets placed at distances from each other on the same scale as the visible solar system or even larger. The electron is capable of attaining a speed of 540,000,000 miles per hour. The mind reels at such minute sizes of particles of matter and the enormous speed at which they are capable of travelling. Each electron carries a unit charge of negative electricity and the proton carries a charge of positive electricity equal to that of the sum total of the electrons. A disturbance in this equilibrium by the addition or subtraction of electrons causes some atoms to be charged with positive electricity and others with negative electricity, and is responsible for such a phenomenon as the lightning. Any disturbance in the stable condition of the atom whether brought about by variation in the number of its electrons or in the speed with which they revolve or in their orbits causes ripples in the ether, which go on travelling in space till they are absorbed.

This is believed to be due to electro-magnetic attraction and repulsion of electrons and therefore these waves are electro-magnetic waves. The universe has become what it is on account of this play and interplay of electronic energy. So far as we are concerned and so far as is known at present life has taken shape in this world as a result of radiation, i.e., electro-magnetic waves transmitted from the sun. The quality of every cell in the organism, its growth and functions, its environment and evolution are all determined by the innumerable kinds of radiations which flow from the sun. The physiological action of these radiations which have made us what we are is therefore undoubted though we do not know it perfectly.

In days when chemistry had not developed, herbs or substances which were known to have beneficial effects were administered wholesale. Chemistry analysed them and isolated the useful ingredients and thus avoided the unnecessary waste of bodily energy involved in the process of throwing out the unwanted ingredients. In physical therapy we go a stage further, i.e., the passage from chemical methods to radiation methods marks a further stage in refinement. Instead of making a tincture we prepare a ray which has a selective action on the cells of the part to be treated. The part is directly approached. You will thus see that ray therapy is as natural and rational or even more than

chemical medicine at first sight appears to be.

The cells of the body cannot be dealt with effectively except by radiation of the particular type to which they respond. Some rays they reflect, some they allow to go through, and some they absorb. It is the task of ray therapy to know the selectivity of the bodily cells and of the radiations. The phenomenon of colour makes it obvious that there is a subtle scheme of selectivity which pervades all creation. Red objects absorb all visible rays except the red ones. Yellow things absorb all visible rays except the yellow ones. This colour selectivity is with regard to the very small segment of the spectrum known as the visible spectrum. The selectivity of the rays comprised in the vastly greater invisible segments of the spectrum is not so easy to detect but it cannot be doubted that for each kind of cell there are radiations which act on them in a particular way. It may be destructive or constructive. We have an example in the *gamma* rays of radium which from all other cells of the affected parts select the cancer cells for destruction. To explore the selectivity of radiation with reference to bodily cells is the main business of ray therapy.

Physics.—In 1666 Newton laid the foundation of ray therapy. In that year he discovered the spectrum and showed that the white sunlight was composed of seven different colours. By passing a beam of light through a prism it was broken up into its component parts. The spectroscope is the instrument employed for this purpose. Not only solar light but any light produced from any substance heated to incandescence stage can be thus broken up. By passing it through a spectroscope an image is obtained in which different colours are shown. This discovery of Newton later led, as we shall see, to the discovery of various invisible radiations which are used in ray therapy. These colours are always arranged in a fixed order. The location of these colours on the spectrum relatively to each other is never changed. Their position is determined by their wave-lengths. The shortest wave-lengths come first and then the longer and so on. This brings us to the important question, what is wave-length?

We have seen that the radiant energy is transmitted in ripples or waves. The distinctive feature of a wave as we know is alternate, dip and rise so that there are successive crests with hollows in between. The distance between two crests is the length of the wave, and is technically called wave-length. Wave-length is the one quality which differentiates one ray from another. The difference in red and yellow radiation, *i.e.*, the difference in colour effect, is due to difference in wave-length. If it is possible to change the wave-length of red radiation into that of yellow the colour effect will also change but such change is thought impossible at present. To give the wave-length of a radiation is to define it completely. We do not know why

but the difference in wave-length makes one radiation highly penetrative, another to have biological effects, another to have heating effects, and so on. Wave-lengths are measured in terms of the Angstrom units which is one ten millionth of a millimetre. The wave-lengths of the visible rays are as under :—

Violet	..	..	3,900-4,300A.
Blue and indigo	..	..	4,300-4,900A.
Green	..	..	4,900-5,500A.
Yellow	..	..	5,500-5,900A.
Orange	..	..	5,900-6,200A.
Red	..	..	6,200-7,700A.

This is also the order in which they appear in the spectrum. This portion of the solar spectrum is called the visible. This is not the whole spectrum. It is in fact an infinitesimal part of the solar spectrum. There are invisible radiations beyond both ends of the visible spectrum. The proportion of the visible spectrum to the entire electro-magnetic spectrum is thus described by Luckiesh. If the normal spectrum of this entire range of wave-length of radiant energy could be produced and the portion of it due to visible radiation in light were one foot long, the entire spectrum would be several million miles long. The invisible spectrum on the violet end is called the actinic or chemical spectrum as the rays on this side have marked chemical action. So far the following rays have been discovered on this side :—

		Used in medicine
Cosmic rays	.. 0.003-0.006A.	No.
Gamma rays	.. 0.02-1A	0.1A.
X-rays	..	
Ultra-violet rays	2,000-3,900	2,000-3,900A.

The invisible spectrum on the red end is called the thermal spectrum as the rays have marked heating action. The radiations known on this side are :—

Infra-red	.. 7,700-500,000A.	7,700-80,000
Hertzian waves	.. 500,000A to many kilometres.	3-30 metres.

Apart from the *gamma* rays of radium and Röntgen rays and cosmic rays which form separate subjects the rays mainly used in ray therapy are ultra-violet, visible, infra-red, and short Hertzian waves.

Next question is, from where do we obtain these rays? There are two sources of radiations, natural and artificial.

Sources.—The natural source is the sun. The size of this huge glowing radiator is three hundred thousand times that of the earth. All possible radiations emanate from the sun as all the 92 elements which compose matter are in the sun in incandescent condition, at a temperature of 10,000°C. Out of the total radiant energy issuing from the sun, we intercept a two thousand millionth part of it. This fraction passes through about ninety-three million miles of ether and through about a hundred miles of the earth's atmosphere. Ether is not absorbent so the radiations are absolutely unchanged till they reach the atmosphere. This atmospheric

envelope of earth absorbs about 40 per cent of these radiations allowing 60 per cent to come in contact with us. This 60 per cent is also not received uniformly at all places and at all times. The average solar spectrum extends from approximately 2,900A to 50,000A. This range covers a portion of the ultra-violet rays, the visible rays and a big slice of the infra-red region. The shorter wave-lengths below 2,900A are absorbed by the clear ozone in the upper atmosphere.

After that the local variations in the atmosphere affects their further progress towards the earth. When the sun's rays have to pass through a longer column of atmosphere, as in the morning and evening, the absorption of shorter ultra-violet rays is greater. Similarly, where there are more dust particles in the atmosphere as over big cities the ultra-violet rays are greatly absorbed. Big industrial towns have very poor ultra-violet value.

The solar spectrum is continuous, beginning from 2,900A to about 20,000A, faintly extending up to 50,000A. The percentage of various wave-lengths in the solar spectrum is :—

2,900- 4,000	..	..	3.9 per cent
4,000- 7,600	..	..	43.7 "
7,600-15,000	..	..	35.6 "
15,000-50,000	..	..	16.8 "

On clear days the maximum intensity of illumination due to direct sunlight is about 8,000 foot-candles and to combined sunlight and skylight is as great as 10,000 foot-candles and the maximum intensity of energy varies from 1.5 to 1.45 calories per square centimetre per minute. This energy is sufficient to melt a layer of ice 400 feet thick per year. This energy is equal to one watt per square inch of the earth's surface.

Artificial sources most commonly used are carbon, mercury and tungsten and to a less extent iron and graphite. To ignite them and maintain them in incandescent state in which they emit the best of their radiations, electric current is found to be most useful. If resistance is contrived in the course of the electric current, heat is produced to overcome resistance. This ignites the resisting substance and disturbs the electrons in its atomic systems, producing electro-magnetic waves. This stage can be produced by any method of heat, but, to maintain that stage with full control, electricity is the best agent known at present.

Carbon.—This substance was the first and most commonly used in artificial sunlight. It is the best imitation of sunlight known at present and there should be no wonder at it as carbon the all-essential element of living organisms is really the storehouse of solar energy. It stored sunlight when it primarily existed as vegetable life on the face of the earth. That stored sunlight becomes manifest again when carbon is ignited. Finsen used it in local treatment of lupus and also for general treatment. Its spectrum is continuous. Its range of spectrum

is from 2,900A to 50,000A. Its spectrum can be varied by introducing different substances in its core. Some of the substances commonly used for this purpose are iron, tungsten, and cobalt. The special spectra of these substances would be added to that of the carbon. Some would lengthen the spectrum of the ultra-violet side and some on the infra-red side.

Mercury.—Its spectrum is discontinuous as many wave-lengths are absent. It is very rich in the short wave-lengths in the ultra-violet region. The shortest wave-length obtained is about 2,000A. It contains a large amount of infra-red rays too.

Tungsten.—This gives a continuous spectrum embracing the solar spectrum and extending as far as 2,000A. It is rich in ultra-violet and infra-red rays. The output of radiation though small is constant.

Iron and graphite serve a good purpose as generators of infra-red rays.

Actions.—The basis of ray therapy is the absorption of radiations. On absorption they are converted into heat energy, chemical, mechanical or electric energy, or perhaps into some unknown form. The effects are produced at the point where they are absorbed. We must therefore know how far each of the rays penetrate the skin—the only medium through which they are administered. Out of the whole gamut of spectral energy solar radiation is the region of least penetrability. Penetrability increases as we proceed further on either side of the solar spectrum. Cosmic rays are highly penetrative. So are gamma and x-rays. These are on the ultra-violet side. On the other side are the Hertzian waves which are far more penetrating than solar radiations. In the solar spectrum red and short infra-red are the most penetrating, and ultra-violet and long infra-red are the least penetrating. While the visible and short infra-red penetrate to a depth of a few centimetres ultra-violet about 3,000A penetrate the skin about 1 mm. The penetrability of ultra-violet increases as their wave-length increases and so also the visible rays increase in penetration as they increase in wave-length. Penetration may be increased by compression of the skin. 2,000 to 2,500 penetrate up to the horny layer, from 2,500 to 3,200 to the basal layer. 3,200 to 3,900 up to the corium, and 3,900 to 14,000 to the subcutaneous tissue and a little deeper. After 14,000 the penetrability decreases up to 80,000A.

Actions.—The main physiological effects properly understood at present are thermal, chemical, and biological. Approximately they appear in this order in the electro-magnetic spectrum. The thermal effects are most prominent in short Hertzian waves and infra-red rays. Chemical effects are seen in visible and ultra-violet rays, becoming more pronounced in the latter, and biological action begins to appear in ultra-violet rays, increases in x-rays and is

most marked in *gamma* rays. We shall now consider, the therapeutic utility of these actions.

Thermal.—Man is a warm-blooded animal. It is of vital importance to keep the temperature of the body constant at normal, despite variations in outside temperature. This important function is performed by the skin. Life is made possible on earth by its atmospheric envelope maintaining a particular range of temperature on its surface. In the same way the necessary temperature of the human body is maintained by the skin. A variation of 10° on either side of the normal would make life impossible. Heat is being constantly produced inside the body by the innumerable vital processes going on there. If allowed to accumulate this heat would raise the temperature of the body to an intolerable degree. On the other hand there are great variations in the outside air temperature. How subtle and vital must be the mechanism which maintains the normal temperature of the body, in these conditions ! Such a delicate mechanism stands the chances of frequent derangement and so any agent which would be helpful on such occasions must be considered of great therapeutic value. Radiations perform this function best. They recharge the body with vital warmth. These radiations possess the action of selective heating also. Selectiveness in action justifies preference in therapeutics. Different wave-lengths of infra-red rays can heat epidermis, dermis or subcutaneous tissue as desired and short Hertzian waves can heat deeper tissues of the body and different wave-lengths of short Hertzian are supposed to have some selectivity of action on different tissues of the body.

Another effect of thermal rays is the production of hyperæmia. Whenever the body receives injuries by physical, chemical or bacterial agents, the body forces collect together to counteract the harmful effects. This process is called the inflammatory reaction. Hyperæmia is the primary condition in this inflammation. Often this inflammatory reaction is not sufficient. The best known means to assist and supplement this natural reaction is irradiation with thermal rays. It helps the body to give a better and more efficient fight.

Chemical action is production of vitamin D and increase of calcium and phosphorus in blood, and improvement of blood in general with increase of bactericidal and infection-resisting power of blood.

All these biochemical changes collectively signify one important reaction and that is stimulating the hæmopoietic system and defensive mechanism of the whole body against infection.

This body reaction to radiation is a slow process and hence these immunizing forces will be useful to counteract the effects of chronic infections only.

Biological.—One important action is noticed and that is selective action of α -rays and *gamma* rays in destroying rapidly growing cells. This

action is being utilized in the treatment of malignant diseases.

The above described actions are few but very important. Heat regulating function indicates its use in rheumatic conditions. Hyperæmia becomes useful in all inflammatory conditions and in all aches and pains. Biochemical action of stimulating the blood and its defensive properties make the radiation a useful therapeutic agent in anæmia and all chronic infections specially tuberculosis, and biological action justifies its use in malignant diseases. Now rheumatic conditions, inflammations, tuberculosis and chronic infections, rickets and anæmia and malignant diseases make such a large proportion of human ailments that radiations, even if we ignore other beneficial actions of rays, deserve a very honourable place in the field of therapeutics.

After this general consideration of the principal action of radiation a brief survey of the characteristics of each group of rays will be useful, to make the proper selection of rays for therapeutic purposes. Cosmic, radium, α -ray and short Hertzian waves each constitute a special branch in themselves and we had better limit our description to the spectral range of solar radiations only.

1. *Infra-red.*—The spectral range is from 7,700A to 100,000A. From 7,700A to 14,000A, their penetration is the greatest and so therapeutically this is the most useful range. After 14,000A their penetrability goes on decreasing, and they heat only the superficial layers of the skin.

Sources. Sun or any hot body. Commonly used radiators are tungsten, carbon, graphite and iron.

Action. Heat regulating, stimulating skin and sweat glands causing hyperæmia in skin and subcutaneous tissues, and analgesic action; therapeutic uses chiefly due to penetrative properties and thermal action.

2. *Visible.*—Its spectral range extends from 3,900A to 7,700A. This is composed of seven colours. Our knowledge relating to this range is scanty and empirical. Red is supposed to be stimulant and irritant, the blue depressing and sedative, and the yellow reactive on the gastrointestinal tract. Sources are the sun and any incandescent substances. Commonly used radiators are carbon and tungsten.

3. *Ultra-violet.*—Its spectral range is from 200A to 3,900A but in therapeutic use are those from 2,400A to 3,900A. This group has been more studied and is better understood than the other groups. Its different sections are known to have specific actions, *viz*,

- (1) Erythral range extends from 2,400A to 3,100A. The minimum action is at 2,800A and maximum at 2,970A.
- (2) Pigmentation range from 2,900A to 3,300A.
- (3) Vitamin-D production range from 2,800A to 3,100A.

(4) Coagulating albumin range from 2,490A to 3,020A.

(5) Bactericidal range from 2,100A to 2,960A.

Sources are sun, carbon, tungsten and mercury.

The action is mainly biochemical. Vitamin-D production and improvement of calcium metabolism, stimulation of hæmopoietic system and increase of bactericidal and resisting power against infection are the main effects for which ultra-violet irradiation is used.

Dosimetry is the most difficult and complicated part of ray therapy because it has to deal with invisible agents which are not accurately known, whose action is partially understood, whose production in uniform quality and quantity is difficult and which by their very nature are not easy to measure, and to which every individual patient offers a varying resistance. Difficulty caused by absence of measuring standards is further increased by variation of effects of rays in various quantities; mild doses have a stimulating effect, moderate ones an inhibitive, and strong doses a destructive effect. For these reasons it becomes essential to pay special attention to the following factors :—

1. Source of radiation.

(a) Emission factor. Which gives range of wave-lengths emitted.

(b) Maxima. Temperature point when greatest output of radiation occurs.

(c) Radiation area. Which gives quantity of radiations emitted.

As it is not possible to determine these factors in the case of the sun, we have to measure the radiations at the spot where we want to use them. This would require a special helio observatory.

2. Filtering and supplementing of rays.

As there are no known sources which emit the required kind of rays only, we have to filter out the rays which are not wanted and supplement those which are deficient.

3. Distance between the patient and the source of radiation.

Except for the sun this has an important bearing on the intensity of radiations which varies inversely as the square of the distance. If it is 1 at the distance of one foot it will be $1/4$ at the distance of 2 feet and $1/9$ at the distance of 3 feet.

4. Time of irradiation.

This is determined separately for each patient according to the sensitivity of his skin. The skin reaction is empirically classified in four grades. This erythema value of skin sensibility is the best guide known at present to determine the beginning dose as well as the future increment of dose necessary to have the best result.

5. Area of skin exposed.

A small dose should be given if a large area is to be exposed and a large dose can be given if a small localized area is to be irradiated.

6. Sensitiveness of the patient.

This is the most essential part in dosimetry, but unluckily much attention is not given to it. Systematic study of this part of the subject is of utmost importance.

The reaction of human skin to radiation is not uniform. It varies in different individuals. Variations in radio-sensitivity range from 1 to 75 or even 1 to 400. The result is that radiation which is mild for one man may be quite strong for another. The best guide will be to test the skin reaction to particular radiations in different graduations of time and put some value to different reactions. In fact, production of erythema has been adopted as a basis of appraisal. This erythema basis of classification of skin is a most important and practical guide known at present. Dr. Saidman's sensitometric test of exposing the skin from 1 to 18 minutes and classifying the reaction of erythema and pigmentation in four grades is one of the most useful means of guidance at our disposal at present. In fact erythema and pigmentation are two guiding stars for the radio-therapist. Age, sex, occupation, quality of skin, part of body to be irradiated, pathological conditions and medication are some of the factors which affect the toleration of the body to the radiation. Instead of doing guess-work over all these factors, it will be far better to determine the dose in accordance to the erythema and pigmentation value.

It may be generally stated that the solar energy which comes to the earth's surface has made the earth what it is, including the life on it. That which made life can mend it best. The solar radiations therefore may be theoretically taken to be the best radiations for therapeutic purposes. It is impossible to reproduce the solar radiations artificially. No substance is known to produce the solar spectrum. The sun contains all the elements in incandescent state shooting their various radiations in combinations. Even in the case of certain rays which can also be artificially produced the superiority of solar rays is unquestioned. The solar rays coming from an immense distance are parallel and so all of them can be perpendicularly received over the whole irradiated area. The rays from lamps are divergent from the central source and so oblique, except in the centre. The solar radiations cost nothing. The lamps are so costly. Moreover they are best worked by electricity. They cannot therefore be availed of in places where electric current is not obtainable. In a tropical country where strong sunlight is available for at least 9 months in the year solar energy should be utilized to the utmost.

In a poor country like India the economic aspect of their use enhances their value much more. A structure designed to make the most scientific use of solar rays for therapeutic purposes is the most welcome thing and when it combines efficiency with large scale operations it should recommend itself to all public bodies who have to think and arrange for medical relief

of the large population. Dr. Saidman's design of the solarium answers all these requirements. We have recently constructed a small solarium containing two cabins. It can be used anywhere as it does not require electric current for its operation.

The solarium has been specially designed to enable us to make the best possible therapeutic use of solar radiations. It is built sufficiently far from the city to ensure that the dust which generally rises over a busy town is reduced to the minimum in the atmosphere through which the radiations come to the solarium. By raising it to a height of about 40 feet the dust nuisance is further reduced. The platform on which the solarium cabins are built is mounted on a tower at a height of about 30 feet from the ground which space is filled up by a fixed octagonal masonry structure which is utilized for artificial-ray therapy and for office purposes. The platform is 114 feet long, 10 cabins are built on it each about 13 by 9 feet. These cabins are equipped with all the necessary appliances for sun-ray treatment. In the centre of the platform on one side are the lift and the staircase and on the other is the observatory. To keep the cabins facing the sun an electric motor has been attached to the tower by which the tower is made to revolve in a horizontal plane. It can make a complete round in 30 minutes. As it is essential that the rays must fall on the patient perpendicularly a further adjustment in the vertical plane is necessary. This is obtained by cabin beds which revolve vertically. By means of these two arrangements the sun's rays can be focussed perpendicularly on the patient at any time of the day. The cabins have single bed arrangements. Each cabin has large windows. On the roof there are two sliding lids one of glass and the other of sheet iron. To the bed are attached large concentrators which concentrate three to five times the sun's rays which enter through roof and window. Finsen first used lenses for concentration. Below these concentrators the necessary filters are placed in order to cut off the unwanted rays. Round about the beds are placed lamps which can be used to supplement the natural radiations if necessary. There is an air-cooling arrangement near the sofas. In each cabin there is a bathroom with shower bath arrangement.

The observatory is a very important part of the solarium. There is a separate meteorological observatory where the atmospheric conditions of temperature, pressure and humidity, clouds, winds, etc., are observed and recorded. In the front part of the solarium observatory there is an ingenious contrivance to detect the slightest variation in the facing of the solarium to the sun. This variation can be corrected by revolving the whole solarium in the direction of the sun. The sun's position in the sky is constantly changing during the day and so the solarium has to be adjusted accordingly every five or ten minutes. The solarium observatory

contains several helio-actinometers for the constant measurement of the intensities of the sun's total radiations of infra-red and ultra-violet rays. Their readings are recorded every half hour. To avoid frequent calculations of the time of exposure due to the variations in the intensity of solar radiations, a special counter-helio-actinometer is fitted in which electric current is produced in proportion to the intensity of radiation. This current moves a small motor. The revolutions of this motor are recorded on a dial with unit marks. The needle moves slowly or briskly according to the motion of the motor which depends on the intensity of the radiations. One unit motion of the needle takes about 15 minutes at noon on clear days. This time is lessened or increased if the intensity of solar radiation increases or diminishes.

A special spectroscope with film arrangement is continually taking photographs of the solar spectrum. There is a konimeter to count dust particles in the atmosphere. A sunshine recorder continually records the hours of sunshine and its intensity during the day. The switch-board for the control of all the cabins is kept in the observatory.

The measurement of the skin sensitivity is as important as the measurement of radiations. Skin sensitivity tests are taken of every patient by a special instrument called the skin sensitizer. It enables us to note the erythema and pigmentation reaction of the skin caused by exposures from 1 to 18 minutes. The electro-thermometer records the minutest variations in the temperature of the skin in different regions of the body. There is a complete equipment of artificial source of radiations for general and local treatment. There are two apparatuses for production of short Hertzian waves, one with an arrangement for production of short Hertzian waves of 24 metres and the other for 6-12-18-24 metre waves and artificial fever. There is a unit for deep x-ray therapy. There is also a radium department with 475 milligrammes of radium; appliances for physiotherapy, electrotherapy and heat therapy have been recently added.

As the solarium is equipped with all the means at present available for the therapeutic use of the various kinds of radiations, we are justified in naming the solarium, the institute of poly-radio-therapy.

To commemorate its celebrated founder, we have named the institute after him—Ranjit Institute of Poly-Radio-Therapy.

Climate of Jamnagar

The description of Jamnagar Solarium will not be complete without a few words about the climate of Jamnagar. In its atmospheric aspects, Jamnagar, though a little inland, may be said to be a seaside place. It is 57.37 feet above sea level. It has sea to the north and west of

it. Its climate is moderate, the maximum temperature going to 104.5°F. in May and the minimum to 44°F. in January. The average rainfall is about 23 inches. Out of 365 days of the year on average there are 280 clear days, the remaining 85 are more or less cloudy, on an average for 2 to 4 hours a day. The maximum quantity of ultra-violet rays is recorded in May and June and minimum in July and August. The maximum amount of ultra-violet rays is obtained between 11 a.m. and 1 p.m. during the day and minimum after 3-30 p.m., from 8-30 to 11 in the

morning and 1 to 3-30 p.m. in the afternoon, they are available in moderate quantities.

The counts of dust particles show that in the evening there is an increase of dust particles in the atmosphere from 5 to 50 per cent.

During the four years of its existence we have treated about 10,000 cases. The largest number of cases were of rheumatism, surgical tuberculosis and skin diseases, superficial infection, deficient calcium metabolism and paralysis. The results in leucoderma, elephantiasis and asthma are encouraging.

Medical News

THE PARKES MEMORIAL PRIZE, 1938

IN the absence of any recommendations for the award of the Parkes Memorial Prize for the year 1938, the committee administering this prize fund has decided to withhold the award for the year referred to.

The Parkes Memorial Prize consisting of a gold medal and £30 is awarded annually to the officer who is considered by the committee to have done most to promote the advancement of naval or military hygiene.

In awarding the prize for 1939 (and thereafter until further notice) first consideration will be given to original articles or reports of investigations of value from the point of view of naval or military hygiene, and published in one or other of the various medical journals.

The prize is open to medical officers of the Royal Navy, Army and Indian Army, with the exception of the teaching staffs of the Royal Naval Medical College, Greenwich, the Royal Army Medical College, London, and the Army School of Hygiene, Aldershot.

BOMBAY MEDICAL COUNCIL

THE following extracts from a summary of the proceedings of the meeting of the Bombay Medical Council held on 6th February, 1939, are published for information:—

Before the commencement of the proceedings, the President moved from the Chair and it was agreed that the Council put on record their sense of the loss suffered by the death of Dr. Rajabally V. Patel, who had been a member of the council from the beginning.

The council proceeded to consider the application of Mr. M. S. J. DeSouza, retired military sub-assistant surgeon, for the restoration of his name to the Bombay Medical Register and resolved that his name be restored to the register.

The council proceeded to consider the question raised by the Bombay Medical Union whether, in view of clause (j) of rule 1 in section II of the Code of Medical Ethics, a registered medical practitioner can attend, in response to a manufacturer's invitation, at functions wherein scientific films, etc., are shown by firms or manufacturers or their agents or where trade medical films are exhibited by medical associations, and it was resolved that so long as no reference is made to any proprietary product, it is not in contravention of clause (j) of rule 1 in section II of the Code of Medical Ethics for medical practitioners to attend any such functions.

The council proceeded to consider an allegation against Mr. Chimanlal L. Amin, M.B., B.S., that a certain vaccination certificate and an anti-cholera inoculation certificate given by him to a passenger were not true, and, after taking into account the results of the enquiries made in regard to the marks of the vaccina-

tion and anti-cholera inoculation, what serum was used for the inoculation, how he made sure about the identity of the person concerned, how long the person was known to him, etc., it was resolved that Mr. Amin be warned to be more careful regarding the identity of the persons to whom he gives certificates.

The council proceeded to consider a motion made by Mr. U. B. Narayanrao (1) that Government be recommended to pass an enactment penalizing those using the prefix 'Doctor' or 'Dr.' other than by registered medical practitioners and those holding a doctorate of a recognized university and (2) that the council appoint visitors to attend and be present at the professional examinations required for obtaining the qualifications of the licensing bodies in this province, and it was resolved, as regards the first proposal, that as the point raised therein is already covered by the Bill to Prohibit the Conferment of Unauthorized Medical Degrees, etc., and Assumption thereof, no further action is necessary in respect of this proposal. As regards the second proposal, it was resolved (1) that, so far as the medical examinations of the Bombay University are concerned, it be suggested to the Medical Council of India that they may associate two nominees of the Bombay Medical Council with the inspectors appointed by the Medical Council of India to inspect the medical colleges in the province of Bombay, and that, should the Medical Council of India not agree to the above suggestion, the Bombay Medical Council should appoint their own visitors to be present at the university medical examinations, and (2) that, with regard to the examinations of the College of Physicians and Surgeons of Bombay, the question be considered along with the other items suggesting the appointment of visitors to attend and be present at the examinations of the D.O.M.S. and the D.G.O. of the college.

The council proceeded to consider the following reply received from Government with regard to a previous resolution of the council (*viz.* that the council is of opinion that the practice of getting countersignature on medical certificates granted by registered medical practitioners is against the principles and spirit of the Bombay Medical Act, VI of 1912 [section 10(2)], and recommend to Government to put a stop to this practice):—

Government's reply.—'Medical certificates granted by registered medical practitioners recommending leave to Government servants are ordinarily accepted by Government and the heads of Government offices in this province, provided that the certificates are in the form prescribed by Government. It is only in special cases where an excessive amount of leave is recommended, or where the head of the office has special reasons that the right of calling for a second medical opinion from the presidency surgeon or the civil surgeon is exercised. In the circumstances Government is unable to accede to the request made by the Bombay Medical Council'.

And it was resolved that Government be requested to inform the officers to whom medical certificates are referred that they should comply with rule 8 in section II of the Code of Medical Ethics, which is quoted below:—

'S. When it becomes the duty of a practitioner occupying an official position to see and report upon a case of illness or injury, he should communicate with the practitioner in attendance, so as to give him the option of being present. The practitioner seeing the case officially should scrupulously avoid interference with, or remark upon, the treatment or diagnosis that has been adopted.'

The council proceeded to consider the requests for the recognition of the D.O.M.S. and the D.G.O. of the College of Physicians and Surgeons of Bombay for registration as additional qualifications and inclusion in Table (G) given in the Bombay Medical Register and, dealing with the proposals of the executive committee for the appointment first of visitors to attend and be present at the examinations for these qualifications, it was resolved that the following visitors be appointed to attend and be present at the examinations for the L.C.P.S. of the college:—

The President .. For surgery, midwifery and examination for the D.G.O.

Dr. P. C. Bharucha .. For medicine.

Messrs. C. J. Ghia and V. D. Sathaye. For ophthalmology and examination for the D.O.M.S.

The council proceeded to consider the application received from Mr. Rajekhan for permission to be registered under section 7(3) of the Bombay Medical Act, VI of 1912, and it was resolved that Government be informed that, in the opinion of the council, Mr. Rajekhan be given permission to be registered under section 7(3) of the Bombay Medical Act, 1912.

The council proceeded to consider the draft Bill to Provide for the Registration and Inspection of Nursing Homes received from Government for the opinion and suggestions of the council and it was resolved that the Bill be approved, subject to certain alterations suggested therein by a sub-committee appointed to consider and report on the subject and by the executive committee.

The council proceeded to consider a Government letter asking for the advice of the council whether certain medical graduates of the Tilak Maharashtra Vidyapeeth, Poona, or any of them, should, in view of the circumstances mentioned by Government, be registered under the Bombay Medical Act, 1912, and it was resolved that under the provisions of the Bombay Medical Act, 1912, the practitioners mentioned by Government cannot be registered.

The council proceeded to consider a Government letter regarding the question of reservation of seats for the province of Sind on the Bombay Medical Council and it was resolved that the Government of Sind be allowed to nominate two representatives on their behalf for nomination as members of the Bombay Medical Council.

The council proceeded to consider a Government letter in connection with the proposal that it be urged again on the Government of Portuguese India that all medical practitioners registered under the Bombay Medical Act, 1912, should be permitted to practise medicine in Portuguese India on a reciprocal basis, and, after taking into account the circumstances mentioned by Government, it was resolved that the matter be dropped.

THE BIRTH CONTROL RESEARCH COMMITTEE

THE Secretary, Birth Control Research Committee of Vile Parle, informs us:—

The number of people who visited and sought advice at the Birth Control Centre at 166A, Vincent Road, Dadar, Bombay, conducted by the Birth Control Research Committee of Vile Parle, during the quarter ending 15th March, 1939, was 1,140 out of which 625 were males and 515 were females,

NUTRITIVE VALUE OF INDIAN FOODS

THOSE who want to plan diets either for themselves or for others will find their task made easy by *Health Bulletin No. 23* on 'The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets', a second edition of which has just been brought out.

Data have been collected about the composition of some 50 more foodstuffs and added to the analyses of some 200 common Indian foodstuffs previously given. While there is room for further studies of special varieties of foodstuffs which are consumed in remote localities and have a purely local distribution, nearly all the common and familiar foodstuffs of India have now been investigated.

The publication is a part of the move to popularize the results of nutrition researches. In the early years of nutrition work, the first objective was to get together the scientific data on which practical work could be extended to the homes of the people. This material has since been collected by the workers at the Nutrition Research Laboratories, and is now being made available to the public.

Prefaced by a summary of modern ideas about diet, an account is given in the *Bulletin* of calorie requirements, and standards suitable for the various age and sex groups in India are suggested. Next, protein, fat, and various vitamins and minerals are dealt with, with special emphasis on the minimum requirements of each.

It is advisable, says the *Bulletin*, that those who are responsible for the institutional care of children, etc., and all who are concerned with practical nutrition work, should have some idea of the effects on the body of a diet which is ill-balanced and defective... e.g., of a diet which is largely composed of milled cereals and contains an insufficiency of proteins, mineral salts and vitamins, and which calls for improvement. There is a long list of diseases, common in India, due in some way or other to dietetic causes. Such are: beri-beri, certain anæmias of pregnancy, keratomalacia, osteomalacia. States of malnutrition which fall short of serious disease are widespread.

A well-balanced diet is essential if growth and development are to take place normally. The frequency of minor ailments in school children can be reduced by improving the diet. But well-balanced diets are in general more expensive than deficient ones. It is on this point that the nutrition worker encounters the main difficulty. Those who suffer from under- and mal-nutrition usually cannot afford to purchase a satisfactory diet. But even when poverty prevents the purchase of a diet which satisfies modern standards of nutrition, it is often possible to make effective improvements with little increase in cost, and how these improvements can be effected are indicated.

Information is given in tabular statements about protein, fat, carbohydrate, fibre, calcium, phosphorus, iron, calories and vitamins, and appendices are added with data about the biological value of the proteins of various foods and the availability of iron in certain foodstuffs.

Stress is laid on the value of what are called the 'protective' foods.

Human beings, and particularly children, cannot thrive at their best on a diet largely composed of cereals such as rice, millet, etc., and insufficiently supplemented by other foods. To make good the deficiencies of such a diet, they must consume fair quantities of foods like milk, green vegetables, eggs, fruits, etc. These are sometimes known as the 'protective' foods, since they are rich in proteins, vitamins and mineral salts, and protect the body against the ills which result when the diet is largely based on less nutritious foods, such as milled rice. Cod-liver oil, which is very rich in vitamins A and D, may be classed as the most valuable 'protective' food.

In general, diets in India are defective because they do not contain 'protective' foods in sufficient abundance. The aim in public health nutrition work in general, and planning 'well-balanced' diets, must be to increase intake of 'protective' foods. The classes in the community which are particularly likely to

suffer if their diet is defective are infants and growing children, and expectant and nursing mothers.

It is not only the poor, whose choice in the matter of food is extremely limited, who are ignorant and prejudiced about diet. Many people in India and elsewhere, who could afford to consume and feed their children on an excellent diet, do not in fact do so. One can readily find among children of the more prosperous classes cases of serious malnutrition and food deficiency disease.

In drawing up a new diet schedule, or in assessing the value of an existing schedule, it is essential to know whether enough food is being provided. It might be thought that it is easy enough to discover food deficiency, for such deficiency must cause hunger. But experience has shown that human beings can adapt themselves, at a low level of vitality and with their powers impaired, to an insufficient ration, and scarcely realize that they are under-fed. The nutrition worker, in setting up standards of food requirements, ignores this remarkable faculty of the body to adapt itself to semi-starvation. His standard of food intake implies full satisfaction, enough to enable human beings to lead an energetic life at a reasonably high level of working capacity.

There are, of course, many kinds of public health nutrition work besides the planning of adequate diets. The task of the nutrition worker is often to make special additions (e.g., milk, cod-liver oil, various vitamin-rich preparations) to an unsatisfactory diet rather than to plan the whole diet afresh. Infant feeding is a subject demanding special knowledge and training. But in all branches of practical dietetics the fundamental principles involved are the same, and an understanding of them is essential for successful work in this field.

The first edition of this *Bulletin* had a wide circulation in India. The low cost (2 annas) brought it within the reach of an extensive circle of readers. About 25,000 copies have been sold, a figure indicating a popularity rarely achieved by public-health bulletins.

The second edition retains the price of the first. Corrections necessitated by advancing knowledge have been made here and there and a few passages have been clarified in the light of experience gained during the distribution of the first edition.

At the special request of a number of readers, a section dealing with infant feeding, including dietary requirements of infants, breast feeding, artificial feeding, weaning and the difficulties of infant welfare work in practice, has been added. In 1935 about 1,250,000 Indian infants died before reaching the age of one year. A high percentage of these deaths was due to malnutrition.

Another useful addition is a list of Hindustani equivalents for the names of most of the foodstuffs.

THE CHOLERA DANGER AND THE NECESSITY FOR USING GENUINE VACCINE

IN 1938 the attacks and deaths from cholera in British India, as recorded in the office of the Public Health Commissioner, totalled approximately 323,243 and 158,010, respectively. The worst affected provinces were the United Provinces with 70,000 cases and 34,000 deaths, the Central Provinces with 94,000 cases and 43,000 deaths and Bengal with 86,000 cases and 45,000 deaths. The Punjab reported 8,600 cases and 4,600 deaths during the same period.

This grave incidence of cholera has been a matter of serious concern to the country and the subject came under exhaustive discussion at the Medical Research Conference held in Delhi in December and at the second meeting of the Central Advisory Board of Health in Madras in January.

Recent research work under the Indian Research Fund Association has thrown new light on the nature of the cholera organism. It has been shown that there are in nature many organisms which resemble the cholera organism but do not cause the disease. The value of inoculation against cholera is now generally

recognized and the number of inoculations carried out in India shows a large regular increase over the last few years. It is, therefore, of the greatest importance that the vaccine used for protection against cholera should be prepared from the genuine cholera organism.

The Central Advisory Board of Health at its meeting in January recommended that this fact should be made widely known throughout India, not alone to health officers, medical officers and private medical practitioners, but also to the general public.

The Cholera Advisory Committee of the Indian Research Fund Association considered the question of the sources of supply and nature of anti-cholera vaccines used in the several provinces in India. The vaccines used are obtained from (a) laboratories under the control of the Central and Provincial Governments or their Public Health Departments, and (b) commercial firms.

Examinations carried out on cholera vaccines available in the market in India during the last 18 months have indicated that in certain cases these vaccines were not prepared from the strains of the true organism. The view of the Cholera Advisory Committee, which was accepted by the Medical Research Conference, is that no protection against cholera can be expected from the use of such vaccines.

It is, however, by no means certain that those engaged in the manufacture of anti-cholera vaccines are all sufficiently acquainted with recent bacteriological findings. It would be disastrous if the people of India lost their belief in the value of anti-cholera inoculations. It is therefore the duty of all health officers, medical officers and private practitioners to ensure that the cholera vaccine they use possesses a high protective value. With that object, they should assure themselves that it is manufactured from a suitable strain of organism in accordance with the recommendation made in 1936 by the Cholera Advisory Committee regarding the technique of manufacture of cholera vaccine and the strains to be used.

For the purpose of ensuring that the vaccine is made from correct strains it is recommended that those employed in the manufacture of the vaccine in India should be strains tested and issued by certain specified laboratories which have been continuously engaged in the study of the cholera vibrio. The Directors of the Central Research Institute, Kasauli, the Calcutta School of Tropical Medicine and the King Institute, Guindy, have expressed their willingness to issue suitable strains to all laboratories, including those of commercial firms, for this purpose.

Copies of the recommendations made by the Cholera Advisory Committee in 1936 are available on application from the office of the Public Health Commissioner with the Government of India.

INDIAN MEDICAL COUNCIL

IN exercise of the power conferred by clause (a) of sub-section (1) of section 3 of the Indian Medical Council Act, 1933 (XXVII of 1933), the Central Government is pleased to nominate Lieutenant-Colonel T. C. Boyd, M.R.C.P. (Irel.), F.I.C., F.R.C.S. (Irel.), D.P.H. (Irel.), I.M.S., Officiating Surgeon-General with the Government of Bengal, to be a member of the Medical Council of India, from Bengal, with effect from the 30th March, 1939, *vice* Major-General P. S. Mills, C.I.E., I.M.S., resigned.

THE FACULTY OF TROPICAL MEDICINE AND HYGIENE, BENGAL

THE following students are declared to have passed the D.T.M. Examination, Session 1938-1939:—

Passed

(Arranged in alphabetical order)

1. Abu Mozaffar Noosin, M.B. (Cal.), private practitioner.
2. Hari Pado Banerji, M.B., B.S. (Lucknow), private practitioner.

3. Dharendra Kishore Bhattacharjee, L.M.F. (Dacca), Assistant Medical Officer, Mazengul Tea Estate, Assam.
4. Des Raj Bowry, L.S.M.F. (Punjab), Sub-Assistant Surgeon, N. W. Railway.
5. Panchanon Chatterji, M.B. (Cal.), private practitioner.
6. Satya Ranjan Chatterji, M.B., B.S. (Patna), D.P.H. (Cal.), private practitioner.
7. Devaprasad Choudhury, M.B., B.S. (Patna), D.P.H. (Cal.), School Medical Officer (temp.), Bhagalpur Division, Bhagalpur.
8. Nikhil Ranjan Das Gupta, M.B., B.S. (Patna), private practitioner.
9. Joseph Michael Francis D'Mello, Diploma Medical College, Madras, I. M. D., Military Assistant Surgeon, Government of India.
10. Indar Sen Jetley, M.B., B.S. (Punjab), Professor, Gurukul Kangri Ayurvedic College, Haridwar.
11. Wazir Chand Jolly, L.S.M.F. (Punjab), L.T.M. (Cal.), private practitioner—Awarded the 'Chuni Lal Bose' Gold Medal, 1939.
12. Shanker Das Kapur, M.B., B.S. (Lucknow), private practitioner.
13. Kimsong Siambhakdi, M.B. (Siam), Medical Officer, Department of Public Health, Siam.
14. Jagdish Sahai Mathur, M.B., B.S. (Lucknow), private practitioner.
15. Md. Khayber Hossain Khan, M.M.F. (Cal.), private practitioner.
16. Md. Sunawar Ali Laskor, M.B. (Cal.), private practitioner.
17. Mohammad Abu Zaffar, M.B., B.S. (Patna), private practitioner.
18. Mohammad Abdur Rahman, M.B., B.S. (Punjab), Sub-Assistant Surgeon, Punjab Subordinate Medical Service.
19. Hugh Archer Murphy, Diploma, Grant Medical College, Bombay, I. M. D., Military Assistant Surgeon, Government of India.
20. Joseph Pereira, M.B., B.S. (Madras), private practitioner.
21. Prayaga Venkatesam, M.B., B.S. (Vizag Medical College), private practitioner.
22. Asutosh Purkayastha, M.B. (Cal.), private practitioner.
23. Nityanirajan Roy, M.B. (Cal.), private practitioner.
24. Daya Shankar Shukla, M.B., B.S. (Lucknow), private practitioner.
25. Brahma Nand Singh, M.B., B.S. (Patna), private practitioner.
26. Sudhir Chandra Som, M.B., B.S. (Patna), D.P.H. (Cal.), private practitioner.
27. Godwin Lionel Robbins Tapsall, M.R.C.S. (Eng.), L.R.C.P. (Lond.), I. M. D., Military Assistant Surgeon, Government of India.
28. Tribeni Prasad, L.M.F. (Rangoon), L.T.M. (Cal.), Sub-Assistant Surgeon, Burma Railways.
29. Pranlal Ranchhodlal Trivedi, L.C.P. & S. (Bom.), L.T.M. (Cal.), Medical Officer-in-Charge, Infectious Diseases Hospital, Ahmedabad Municipality.
30. Ruth Frances Wordsworth, M.R.C.S. (Eng.), L.R.C.P., D.P.H. (Lond.), private practitioner.

Current Topics

Alcoholic Intoxication and Pneumococcal Infection

(From the *Journal of the American Medical Association*, Vol. CXII, 21st January, 1939, p. 240)

CLINICIANS have observed for many years that alcoholic intoxication is a predisposing cause of pneumonia and that the death rate in pneumonia in alcoholic addicts is definitely higher than the mortality of abstainers from alcohol. Osler believed that the most potent predisposing factor in pneumonia is the lowered resistance due to alcohol. A most convincing clinical report on alcohol as a predisposing factor in pneumonia was published in *The Journal* fifteen years ago by Capps and Coleman. Among 3,422 cases of pneumonia at Cook County Hospital in Chicago they found that the mortality rate among the excessive drinkers was 49.87 per cent, among the moderate drinkers 34.4 per cent, and among the abstainers or occasional drinkers 22.45 per cent.

Medical literature contains many reports of both clinical and experimental observations which point strongly to the fact that alcoholic intoxication lowers the resistance not only to pneumococcal infections but to other infections as well. This literature has recently been reviewed by Pickrell of Johns Hopkins University. In 1884 Robert Koch reported observations that during cholera epidemics most of the people who became sick had been guilty of alcoholic excess. Koch followed his clinical studies by experimental work, in which he showed that intoxicated rabbits died sooner of cholera than did similarly infected non-intoxicated animals. Abbott demonstrated that the resistance of rabbits to infection by *Streptococcus pyogenes* was diminished through the influence of alcohol and that the susceptibility of such animals to certain other types of infection was increased by alcoholic intoxication. Laitinen demonstrated unmistakably the deleterious effect of alcohol on the resistance of animals to anthrax; practically all his alcoholized animals died of anthrax,

whereas most of those that had not been given alcohol recovered. In reviewing the literature, Pickrell was impressed by the fact that few of the studies had been adequately controlled and that none of them gave a satisfactory explanation for the effect apparently brought about by alcoholic intoxication. He therefore devised and with the assistance of Dr. Arnold R. Rich carried out an extensive series of experiments in an attempt to discover the mechanism by which this occurs.

In brief, the experiments consisted of immunizing rabbits by intravenous injection of type I pneumococcus serum, then of intoxicating some of them with ethyl alcohol until stuporous and then of infecting all of them and the control animals with the same dose of type I pneumococci injected into the skin. In a type experiment twelve rabbits were immunized against type I pneumococci. In a few hours intoxication with alcohol was induced in six of these animals, and all of them, as well as the control animals, were injected in the flank with 0.1 c.c. of an eight hour type I pneumococcus culture. In four hours the non-immunized rabbits gave a positive blood culture and all such animals died within eighteen hours. The immunized rabbits which had been intoxicated showed a positive blood culture at from nine to ten hours and death occurred within twenty-four hours. The immunized rabbits which were non-intoxicated did not develop a positive blood culture and they survived. The immunized group which had not become intoxicated developed only a minute erythematous lesion at the site of injection. The non-immunized rabbits which had not been intoxicated developed about the site of injection a large purpuric, oedematous, hyperæmic lesion which extended to the belly surface. In striking contrast, no macroscopic lesion developed in any of the intoxicated rabbits at the site of the injection. In all the non-intoxicated animals microscopic examination revealed a dense leukocytic infiltration at the sites of injection but in the intoxicated rabbits there was practically no leukocytic emigration, and bacteria swarmed in the tissues

marked local and systemic reaction. Particular foods likewise frequently play a similar rôle.

The recognition of food allergy in these cases necessitates use of the test diet method of study. Cutaneous tests yield misleading information. Both false positive and false negative reactions are obtained. It is frequently necessary to repeat the test diet studies in order to demonstrate the mechanism in a given patient. Negative results at one time may give way to clear-cut and predictable response to the successive exhibition and withdrawal of a particular food a few weeks or months later. The reactivity of the colon therefore exhibits a phasic variation in this respect, apparently corresponding to successive periods of sensitization and desensitization. In some instances evidence of food allergy is obtainable during periods of activity of the disease. In others this factor is demonstrable only in the early stages of recurrence.

Satisfactory allergic studies were completed in sixty-seven cases. Classification was based on the subjective phenomena reported by the patient and more particularly on the appearance of the mucous membrane of the rectum and the rectosigmoid at repeated proctoscopic examinations after each change in diet. Clinical evidence of active food allergy was obtained in forty-four cases. In seven others the evidence was equivocal. A history of allergic disease in the patient or in the patient's family was not a common finding. Idiosyncrasies to certain foods have been noted by about half of the cases. In the order of frequency, the foods most commonly at fault were milk, orange, wheat, spinach and tomato.

Secondary or conditioned deficiency disease has occurred as a complicating factor in forty-six of the cases. It appears to be the expression of the combined deficit of a number of essential factors. Lowering of the plasma proteins and inversion of the albumin-globulin ratio is not uncommon. The blood calcium is frequently below normal levels. The vitamin A and vitamin C values are often low, and it is probable that certain of the other vitamins are similarly affected.

These mixed deficiency states appear insidiously and gradually assume increasing significance. They may play a most important rôle in the course of the disease and in the more severe cases may determine the outcome. Recognition of this complication and intensive therapy is essential.

COMMENT

These observations have led me to certain conclusions concerning the mechanism of chronic ulcerative colitis. The evidence so far available does not justify the hypothesis that the disease is a specific infection resulting from the primary action of a single specific micro-organism. On the contrary, there is much evidence to indicate that it may be initiated by any one of a number of bacteria, known to be pathogenic and known to produce inflammatory lesions in the colon. Once the mucosal barrier has been broken by such an agent, secondary infection necessarily occurs. The secondary invaders will naturally include certain of the bacteria present in the colonic contents. Sections of colon removed surgically or at autopsy and stained for bacteria reveal Gram-negative bacteria in the more superficial portions of the affected tissue and Gram-positive organisms in the deeper levels. Under such conditions it is not remarkable that conflicting observations have been recorded, nor is it remarkable that special methods will yield certain types of bacteria in significant numbers. Both types of observation are factual. Unfortunately they have tended to create dissension rather than progress.

The phenomena of the disease appear to result from the combined action of a number of factors. There is infection, probably always mixed in character, of the affected portion of the wall of the colon. Both the secretory and the motor physiology of the gastrointestinal tract are adversely and variously affected. Sensitization of the colon to foreign protein of bacterial and dietary origin plays an important rôle in the mechanism of relapse and activity of the disease. Not

infrequently secondary deficiency states occur and assume major clinical importance.

TREATMENT

The medical management of chronic ulcerative colitis must be based on this complex mechanism and it must be guided by the phenomena observed in the particular case. In the past the greatest emphasis has been placed on antibacterial measures. This originated in the concept that ulcerative colitis is a simple infection and that its effects, both pathologic and physiologic, are restricted to the colon. This hypothesis is no longer tenable. The great variety of antibacterial measures advocated bears mute but impressive testimony to the inadequacy of all.

Disturbances of normal physiology must be compensated. Hydrochloric acid in amounts up to 4 c.c. with meals is of definite value in the presence of anacidity. It tends to control distention and flatulence and to curtail the diarrhoea. Sedatives such as phenobarbital and at times opium derivatives are useful in the presence of a hypermotile colon. They are contra-indicated in those cases presenting a slow colon motor rate. In the latter the number of stools and the amount of pain are usually reduced by a properly adjusted daily dose of a saline cathartic and large fluid intake.

Adjustment of the diet to the needs of the patient is essential. A high protein low carbohydrate diet is better tolerated than the conventional high carbohydrate 'colitis diets' traditionally in use. The importance of repeated investigation of the possibility of food allergy by the test diet method cannot be overemphasized.

The vitamin and mineral intake must be maintained at levels above the requirements of the normal individual. This necessitates supplementing the diet by the addition of special sources. Such supplements are essential during periods when the restricted test diets are in use. A constant watch must be kept for the early signs of deficiency disease and when evident they must be strenuously treated.

Autogenous vaccines, if recognized pathogens have been recovered on culture, appear to be helpful when used in conjunction with the other methods of treatment. Evaluation of the effects of vaccine therapy, however, is often difficult, particularly in view of the psychic effect on many patients who strongly believe in their efficacy. On theoretical grounds the rationale for the use of antisera seems less well grounded. I have not been impressed by the results of bacteriophage treatment in this disease.

Certain general measures are applicable. Definite foci of infection should be appropriately treated. Education of the patient to cope more successfully with his psychologic problems is frequently important. The effort to achieve formed stools, especially by the use of bismuth, is ill advised, since it adds to the already complex mechanism—the factor of mechanical trauma to the inflamed mucosa. I believe that the stools should be kept liquid or semi-liquid until healing is complete.

What results are to be anticipated from medical management? It is unfortunate that the word 'cure' has been used in connection with chronic ulcerative colitis. Too frequently it appears as a chronic progressive disease exhibiting periods of spontaneous activity and quiescence. Fifty-one of the patients have had recurrences or have shown continuous activity of the colitis with failure to respond satisfactorily to treatment. It is impossible to say that after any given period of freedom from activity the disease will not recur. In this respect it resembles the problem of pulmonary tuberculosis. It is impossible to be certain from the patient's symptoms or lack of symptoms that healing has actually occurred unless confirmation is obtained by both the sigmoidoscope and the x-rays.

In this respect also the problem resembles that of tuberculosis. Consequently it seems most desirable to borrow from the terminology of the latter disease and to substitute the term 'apparently arrested' for 'cured'.

Twenty-three of the cases are apparently arrested, forty-four are definitely improved but not healed, thirteen are unimproved and death occurred in five.

SURGERY

Prognosis in the individual case depends necessarily on the extent of irreparable damage to the colon and on identification and control of the factors operating to maintain activity of the disease. When extensive anatomic changes have occurred it is vain to hope for restoration to normal. Many such cases constitute serious problems of management. The complications resulting from chronic sepsis are common and, as was the case in two of my fatalities, these complications may lead not only to chronic invalidism but to death of the patient.

In the last few years there has been an increasing tendency to include radical surgery among the available therapeutic measures. The selection of cases and the decision as to when to resort to operative intervention imply the necessity for joint medical and surgical study and supervision both before and after operation. The detailed management of these problems should be carried out under the direct supervision of the senior physician and the senior surgeon of the group. In conjunction with Dr. Henry W. Cave such a detailed and combined approach has been made an integral part of the activities of the Gray Service of the Roosevelt Hospital. This has already been discussed.

Apart from the acute emergencies of impending perforation or repeated massive hemorrhage, surgical intervention should be withheld pending complete evaluation of the particular problem. This entails detailed investigation of the underlying mechanism, decision as to the degree and extent of permanent damage to the colon and the clinical response to conservative treatment. Frequently this requires study of the patient over a period of many months. Failure to achieve clinical improvement, persistence and progression of the lesions as seen at proctoscopy, x-ray evidence of progressive fibrosis of the colon with pseudopolypoid degeneration of the mucosa and the development or progression of the complications attributable to chronic sepsis constitute the elective indications for surgery.

Three operative procedures frequently performed in the past have no place in the management of chronic ulcerative colitis: Appendicostomy, caecostomy and double-barrelled colostomy are based on false premises—the assumption that medicated irrigations will eliminate infection and therefore accomplish cure and that these procedures produce physiologic rest of the colon. These procedures are not curative and frequently are not even palliative. They have the serious drawback of greatly complicating both medical study and treatment and subsequent radical surgery, when and if this becomes necessary.

Elective surgery, therefore, in cases presenting the distal type of colitis and those presenting involvement of the entire colon implies the creation of an artificial stoma proximal to the affected area and subsequent extirpation of the diseased tissue. The comparatively uncommon type of disease in which the lesions are proximal to the sigmoid and in which the lower segment of the colon is normal presents a different set of indications as regards both the choice of procedure and the time for its performance. We believe that operative intervention should not be delayed in these cases. We have observed at least one instance in which extension has occurred downward to involve previously normal lower segment. In this type of case the procedure of choice is early ileosigmoidostomy, with subsequent removal of the diseased portion of the colon.

SUMMARY

The prolonged observation of this series of cases together with isolated observations from many others points to the probability that ulcerative colitis is a chronic disease with an inherent tendency to progression and relapse. It is characterized pathologically by inflammation and ulceration of the mucosa of the colon

and by inflammation and progressive production of scar tissue in the deeper layers of the colonic wall. It is characterized physiologically by secretory and motor disturbances of the stomach, the small intestine and the colon, and at times by disturbed function of other physiologic systems. It appears to result from the action of several different factors operating singly or in conjunction with one another. These include primary infection, which present evidence indicates may be produced by several known pathogenic organisms; secondary infection especially by *Escherichia coli* and *Streptococcus faecalis*; sensitization of the colon to foreign protein of food and bacterial origin, and secondary or conditioned deficiency disease. Successful medical treatment is based on the evaluation and control of these factors. Prognosis depends in part on this and in part on the degree of permanent damage to the colon. Radical surgery should be seriously considered in those cases which fail to respond to conservative treatment, in those which exhibit the effects of chronic sepsis, and early in those which present the proximal type of pathologic change.

CONCLUSIONS

1. Chronic ulcerative colitis appears to be the complex expression of the interaction of several different factors.
2. The disease exhibits an inherent tendency to progression and relapse.
3. Although the prognosis under medical management is good in the pathologically mild and moderately advanced case, the term 'apparently arrested' should be substituted for 'cured'.
4. Prolonged joint medical and surgical observation is essential for the pathologically advanced case.
5. Combined medical and radical surgical treatment offers the best prognosis for many of the pathologically advanced cases.

Vitamin Therapy in Ophthalmic Practice

By JOSEPH LAVAL, M.D.

(From the *American Journal of Ophthalmology*, Vol. XXII, January 1939, p. 33)

Much has been written about the importance of vitamins in general medicine, and three reviews have appeared in ophthalmic literature. It must of course be realized that much of what follows will be only suggestive and show certain trends and indications as to the uses of the various vitamins in ophthalmic practice. Definitely positive statements and findings will be infrequent, but some general conclusions will be self-evident.

VITAMIN A

This vitamin is best associated in our minds with cod-liver oil and recently with haliver oil. It is present in good amounts in eggs, butter, milk, cream, and such dairy products. A deficiency of this vitamin manifests itself clinically first, as night blindness (hemeralopia) and later as xerophthalmia. Recently, dark-adaptation tests in early and beginning A avitaminosis have been advocated, but as yet they are not sufficiently standardized to warrant positive statements. It has been shown that the visual purple of the retina after exposure to strong sunlight regenerates slowly in the eyes of rats on a diet deficient in vitamin A and it has also been proved that the normal retina is rich in vitamin A. Vitamin A has been used to cure xerophthalmia and the hemeralopia due to depletion of vitamin A with, of course, brilliant results, as witness the cases of the fishermen of Labrador as reported by Aykroyd, and the cases of the natives of the Philippine Islands reported by Gamboa. However, vitamin A has been used for the hemeralopia due to retinitis pigmentosa with no improvement at all, as was reported by me in 1933.

Vitamin A is being used also in the conjunctival sac with massage into the cornea in cases of keratitis dystrophica, but the results are variable. Some authors report brilliant results, others no improvement. In the

writer's own experience there were some cases in which it seemed to do much good, others in which irritation and aggravation of the symptoms resulted.

In certain cases of blepharitis and conjunctivitis in children there is no doubt that malnutrition is a factor and here large doses of cod-liver oil are beneficial. Pillat reports the changes in Chinese eyes as a result of vitamin-A deficiency and mentions night blindness, dryness of the conjunctiva, Bitot's spots, xerosis, and even keratomalacia, meibomitis, hordeolum, and blepharitis. Vitamin A is also of use in phlyctenular kerato-conjunctivitis and other related conditions of scrofulous origin. In women a low-grade chronic conjunctivitis with mild photophobia may be due to A avitaminosis as a result of dieting in the effort to keep a streamlined figure. Langdom described the case of a young woman who used no butter, eggs, or milk and had a corneal dystrophy which cleared up on the administration of cod-liver oil.

When depletion of vitamin A is advanced, changes in the lacrimal gland result with diminution and even entire loss of lacrimation. Mori showed that these changes in the lacrimal gland were responsible for conjunctival changes in xerophthalmia, which then gave rise to the corneal changes. Yudkin, in similar experiments, drew different conclusions as to which lesions arose first, but Wolbach and Howe demonstrated that all the changes are due to a replacement of the columnar epithelium by stratified squamous epithelium going on to keratinization.

In diabetics there may be an increased demand for vitamin A, as certain experiments by Ralli *et al.* showed. In depancreatized dogs (artificial diabetes) it was found that definite corneal epithelial changes occurred of the same type as in vitamin-A deficiency. These corneal changes were prevented by feeding cod-liver oil to the depancreatized dogs. Apparently, in these diabetic animals the demand for vitamin A is increased.

VITAMIN B

This vitamin is found in such foods as meats, potatoes, and green vegetables, but is most concentrated in yeast. It has various complex components the most important of which are B₁, the antiberi-beri component (thiamine) and B₂ or G, the antipellagra portion (riboflavin), the absence of the latter causing cataracts in rats. However, for clinical purposes it is to be remembered that concentrated yeast tablets as marketed by any of the reliable pharmaceutical firms contain B₁ and B₂ in high amounts.

In the Archives of Ophthalmology for December 1934, the writer reported a case of bilateral acute optic neuritis with marked diminution of vision associated with pellagra. (It is known that the peripheral neuritis of pellagra and of beri-beri is due to the lack of vitamin B₂ and B₁, respectively.) In this case the pellagra and optic neuritis both were cured, even though alcohol was taken in fairly large amounts daily, because yeast was administered in large doses, thus supplying the necessary quantity of vitamin B₂. In a case of toxic amblyopia due to alcohol, recently observed, vision was improved from hand movements to 20/20 for each eye in a period of two weeks by administering vitamin B₁ and B₂ in the form of yeast tablets, even though some alcohol was taken daily. Carroll reported the same results in a series of cases in 1937, and the present writer quoted Shastid's experience with cases of optic neuritis cured by vitamin B₁ and B₂. In all cases of retrobulbar neuritis, toxic amblyopia, and optic neuritis—whether due to nasal sinus infection, alcohol and tobacco, or multiple sclerosis—it would seem advisable to use concentrated yeast tablets to supply large amounts of vitamin B₁ and B₂.

Similarly, in cases of incipient cataract the same therapy should be carried out, for riboflavin (anti-cataractous for rats) is present in the concentrated yeast tablets. Furthermore, there is sulphur in these yeast tablets (HS-cystine), and some connection between the sulphur content of fish lenses and the

prevention of human cataracts has been reported by Shropshire. A further connection between cystine and the formation of galactose cataracts in rats has also been shown; this will be discussed under vitamin C.

VITAMIN C

This vitamin is found in the citrus fruits—orange, grapefruit, lemon, and lime. The pure crystal in the form of ascorbic acid has been prepared.

According to Bellows and Rosner, 'In normal eyes the lens and aqueous are rich in vitamin C, in the cataractous lens the amount of vitamin C is diminished or entirely absent, and the aqueous of an aphakic eye contains only a slight amount of this substance. Experiments were performed which showed a definite reduction in the vitamin-C content of the blood in persons with cataract. Furthermore, vitamin C is absorbed from the conjunctival sac into the anterior chamber. Presumably this takes place through the cornea'. These investigators also proved that the substance in the lens which reduces a special dye (sodium 2, 6, di-chlorobenzenone-indophenol) is entirely vitamin C, and not any other reducing substances such as sulphhydryls. Bellows went still further and showed that the cataract produced in the albino rat by lactose and by galactose is due to a loss of the sulphhydryl content of the crystalline lens which can be delayed by cystine and to a lesser degree by vitamin C in this type of cataract. Accordingly, it would seem that in cases of incipient cataract vitamin B₁ and vitamin B₂, to supply the cystine, and also vitamin C should be administered. In the writer's own practice this procedure has been carried out for the past four years, but of course no conclusions should be drawn as yet.

Bietti believes that the decrease in the amount of vitamin C in the aqueous and in the cataractous lens is the result of the lens changes and not the cause. He was unable to prevent or influence naphthalene cataract by administering vitamin C.

In 1932 Szent-Györgyi and Svirbely in Hungary proved that hexuronic acid is vitamin C. At the same time King and Waugh of the University of Pittsburgh showed that a crystalline compound which they isolated from lemon juice was identical with hexuronic acid. Szent-Györgyi found that the best source of vitamin C was the peppers grown in Hungary. However, patients with purpura were relieved by the juice of peppers of citrus fruits but not by the pure crystalline vitamin C. On further investigation it was found that citrus fruits and the peppers contain a second substance controlling the permeability of capillaries and this substance is called vitamin P. The symptoms of scurvy seem to be due to a lack of both vitamin C and P.

Accordingly, it would seem advisable for ophthalmologists to utilize the juice of citrus fruits in large doses in attempting to control intra-ocular hæmorrhage whether due to trauma (operative or other) or to some metabolic disease such as diabetes. Yudkin recently advocated the same therapy and seemed quite encouraged by its results. The present writer has also tried it in several cases of intra-ocular hæmorrhage, both postoperative and metabolic, and feels encouraged enough to continue with its use.

VITAMIN D

The use of vitamin D in ophthalmology has been limited to cases of myopia in the hope that this vitamin plus calcium would cause an increase in the amount of calcium in the sclera and thus prevent further stretching. Recently the writer reviewed this subject and gave the results of clinical experiments which showed no favourable influence on myopia after vitamin-D therapy. However, it should be borne in mind that the prescribed dosage of 10 minims daily may have been insufficient. Inasmuch, however, as this is the dosage for cases of rickets we may assume that it is sufficient for cases of myopia investigated clinically. The use of vitamin D in keratoconus has also been suggested.

SUMMARY

It is suggested that in cases of the following vitamin deficiencies it might be theoretically valuable to prescribe the following treatment:—

1. Vitamin A—Prescribe a tablespoonful twice daily in cases of poor dark adaptation, phlyctenular keratoconjunctivitis, photophobia, and low-grade conjunctivitis in women who are on a slenderizing diet or in cases of other corneal and conjunctival lesions in which the history shows a lack of vitamin A intake.

2. Vitamin B (B_1 and B_2)—Prescribe eight yeast tablets daily of the brewer's-yeast type put up by any of the reliable pharmaceutical firms, or the powdered form may be ordered. This is to be used in cases of incipient cataract, in optic neuritis, retrobulbar neuritis, and also in toxic amblyopia.

3. Vitamin C—Order the juice of at least two large oranges or one grapefruit daily in cases of incipient cataract. (This is plus the brewer's yeast which is also to be taken daily.) In cases of intra-ocular hæmorrhage order the juice of four lemons daily.

Reviews

THE NATURAL HISTORY OF POPULATION.—By Raymond Pearl. 1939. Oxford University Press, London, Humphrey Milford. Pp. xii plus 416. Illustrated. Price, 10s. 6d. Obtainable from Oxford University Press, Bombay and Calcutta

THE problem of human fertility has always aroused keen discussion among students of population movements. Half a century ago the Malthusian doctrine of over population prevailed and birth control propaganda was a prominent feature of practical population policy for social amelioration. To-day the world—at least the civilized western population—is faced with fear of deterioration. The fertility of higher social classes is declining. The causes of this differential fertility are, however, not clearly known. It is, therefore, of great interest and value that Professor Pearl has compiled in this book the results of his researches on differential fertility which he has been carrying out for some years past. The material on which his studies have been based throws new light on the reproductive activity of the western population, in particular that of the United States of America.

A brief exposition of his views on the basic biological factors which control the history of population is clearly set out in the opening chapter. An attempt has been made to study the influence of such complex factors as environment, instinct, emotion and intelligence on both the quantitative as well as qualitative aspects of population. Evidence is presented to show that the differential fertility which exists between the whites and the negroes is not innate but can be traced primarily to environmental (non-genetic) influences and particularly to the variation in the prevalence and effectiveness of contraceptive practices.

From a brief consideration of the general biological factors he passes on, in the second chapter, to a detailed discussion of the biology of human fertility. The overt fertility in human beings, as distinguished from innate fertility, is the resultant of the play of a large number of complex factors. Some of the important factors considered in detail are the sexual desire (libido), age, span of reproductive life in female as well as in male, litter size, frequency of coitus, prevalence and effectiveness of contraceptive efforts and reproductive wastage due to abortion, miscarriage and stillbirth. In a concise form the author has presented a volume of material compiled from a variety of sources. A new conception in the study of age variation in fertility has been introduced. Thus in the case of a woman who remains overtly fertile throughout the reproductive period he has studied the manner in which the intensity of fertility would vary with age. He has shown, from data specially collected for this purpose, that the changes in fertility with respect to age are, in certain respects, quite different in the case of a woman who remains fertile as compared with the age specific fertility rates for groups of population. The latter includes a group as large as 56 per cent of women who were previously fertile but became sterile after the age of 28 years. In this chapter he also gives the latest estimates of the safe period, of the mean ages at menarche and at menopause, and tries to appraise the

significance of the effects of such factors, as climatic, social, economic and secular or the human reproductive pattern. For the first time, perhaps, are presented statistical data bearing on the quantitative aspect of the human sex behaviour of American couples. The author has shown that 253 out of each 254 copulations, on the average, which might have been effective were actually unproductive even though no attempts were made at any form of contraception. Some of the results emerging out of his investigations on the copulatory activity of American couples are not only interesting but astonishing. The reproductive wastage in legitimate pregnancies is around 200 per thousand pregnancies. A new statistical index devised by the author, which he has termed 'pregnancy rate' has been described. This according to the author 'measures one aspect of fertility with a higher degree of statistical specificity relative to the biological processes of human reproduction than any other hitherto used'. This concept of pregnancy rates specified for age and colour has been used later on in the book for the study of various problems arising out of differential fertility.

The author has attempted to assess in statistical terms how the human reproductive pattern, particularly of the United States, differs from that of animals lower in the evolutionary scale. Data have been presented in regard to infra-human reproductive capacity. With regard to secular change he believes that, under the present social and environmental conditions, there appears to be a definite trend towards less and less human reproduction, probably without any great lessening of human sexual activity. Thus his statistical studies reveal that only about 10 per cent of the women in the United States who were physiologically potentially capable of reproduction actually reproduced in the year 1930 and that this proportion was definitely smaller for all the age groups of mothers in 1930 than it was in 1920, and this change could not be wholly attributed to an increase in contraceptive efforts in the ten-year period. He has discussed this fertility decline in regard to colour and has shown that a greater decline has been experienced in negro population as compared with the native white and concludes that 'the main burden must surely be placed somewhere else than upon birth control so far as concerns the negroes'.

With the co-operation of the qualified medical staff in the obstetric service of several hospitals in the United States he collected a comprehensive account of the entire reproductive histories of about 31 thousand normal women together with a detailed account of their use of contraceptives. Information was also obtained about other relevant circumstances of their lives, e.g., educational, social, economic, health and religious status. This material afforded a fairly representative sample of the general population and particularly of the urban population of the United States. The frequency of use and prevalence of contraceptive practices and their effectiveness is statistically appraised for population groups differing widely not only in social, educational and racial characteristics, but varying also in age, religious affiliations

and occupations. The author finds that 'if it were not for the effect of contraceptive efforts and the practice of criminal abortion together with correlated habits as to postponement of marriage, there would apparently be little or no significant differential fertility as between the economic, educational, and religious classes of urban American married couples'. One consistent broad result that emerges is that the steady decline in total fertility that has gone on in the past and is even now continuing, not only in the differentiated classes but in the population as a whole, cannot be attributed solely or even primarily to the causes producing differential fertility. Some other obscure factors are involved and for their investigation he devotes the last chapter to a discussion of the population history of the world. He finds that fertility decline although historically of recent appearance is 'a world-embracing phenomena—something affecting man as a species' and is not confined exclusively to the highly civilized countries. Prior to this decline the world population showed within the period 1630 to 1930 a short spurt of population growth resulting in a fivefold increase. This, according to the author, happened because of simultaneous advance in scientific discovery and the application of its results to man's basic requirement, i.e., the exploitation of his natural environment. The consequence of this increase has been an entirely disproportionate increase in population density and his investigations throw light on the various socio-economic questions consequent thereupon. Although the trend of the arguments advanced appears speculative, the chapter provides a dispassionate discussion of the world population problem from social, economic and political standpoints.

The book is well illustrated and for preserving continuity of discussion most of the tables have been set in the appendix. The notes relegated towards the end of the book provide valuable information as well as interesting reading. The bibliography runs to about 700 titles and index adds to the value of the publication.

The great merit of the book, however, is that it provides a masterly exposition and analysis of a unique type of statistical data bearing upon the problems connected with the biology of human reproduction and differential fertility.

S. S.

THE BRITISH ENCYCLOPÆDIA OF MEDICAL PRACTICE: INCLUDING MEDICINE, SURGERY, OBSTETRICS, GYNÆCOLOGY AND OTHER SPECIAL SUBJECTS.—Under the General Editorship of Sir H. Rolleston, Bt., G.C.V.O., K.C.B., M.D., D.Sc., D.C.L., LL.D. Butterworth and Company, Limited, London. (To be completed in 12 volumes.) Sold in complete sets only. Cash price, Rs. 25 per volume. Also available on the instalment system at Rs. 10 per month. Price, Rs. 26-8 per volume. Only available from Messrs. Butterworth and Company (India), Limited, Calcutta. Volume X. Pp. xxiii plus 688 plus 43

THE tenth volume covers subjects from poisons to rosacea. The first chapter deals with legislation in Great Britain on poisons. With the numerous schedules under which poisonous drugs are classed, the subject has become a very complex one, and the chapter will be very welcome to practitioners in this country who are likely to visit England; even if they do not intend to practise there, they will find the information useful when they want to prescribe for themselves or their families. As the near future must bring forth central and provincial legislation on poisonous drugs, we can commend this chapter to those who will help to frame such legislation.

The two most important subjects in this volume are pregnancy and psychology. The former subject is dealt with in a single chapter of 75 pages by Professor F. J. Brown of University College Hospital. Both normal and abnormal pregnancies are considered. A later chapter in this volume is on the puerperium. These two chapters combined with the excellent chapter

on labour in volume 7 make a very complete textbook on obstetrics.

The 160 pages on psychology are divided up into a number of chapters which are contributed by nine writers, psychiatry in children, psycho-analysis, psychoneuroses and psycho-therapy, psychopathic personality, and finally psychoses. The psychoses are dealt with under seven headings. There is a sub-section on neurasthenia in the tropics in which Dr. P. Manson-Bahr has given a very well-balanced and useful account of this condition. Schizophrenia is one of the few psychoses in which active treatment is undertaken with any hope of success; both the insulin and cardiazol-convulsion treatments are described.

Of tropical diseases rat-bite fever by Dr. B. M. Das Gupta and the relapsing fevers by Sir John Megaw come in this volume. Full and clear accounts of these diseases are given. Dr. B. M. Das Gupta dismisses *Actinomyces muris* (*Streptothrix*) as a contaminant and confines his remarks to *Spirillum minus* infection. It is possible that the former also produces a similar clinical syndrome in other countries. Sir John takes a view that he has always championed, and which is now generally accepted, that louse relapsing and tick relapsing fever should be considered as separate diseases, in view of the differences in the epidemiology, the aetiology, and the clinical manifestations.

A good account of the aetiology and treatment of prickly heat is given by a non-tropical worker, Dr. Sidney Thomson of King's College Hospital. The physician in the tropics, who has at some time suffered from this always annoying and occasionally serious condition, is liable to be prejudiced in his opinions on its treatment by his own personal experience; a treatment that will prevent or cure the condition in one person will often have no effect on another, so that this unprejudiced and well-balanced review of the treatments advocated by different observers is welcome.

Printers are guided by strict rules and it is difficult to get them to depart from these, even when the exigencies of the occasion demand; one such rule is that, when a text-figure occupies half a column, it must be placed on the outside half, that is, on the right on the odd pages and on the left on the even. Page 153 of this volume, where three marginal 'captions' happen to coincide with three important structures in a text-figure, provides an example where departure from this rule would have prevented at least one reader from doubting his own mental balance for one brief moment.

It is perhaps significant that this querulous criticism is the only one that the reviewer is able to make.

TREATMENT IN GENERAL PRACTICE. VOLUME III. ANÆSTHESIA: SURGERY. (Articles republished from the 'British Medical Journal'.) 1939. H. K. Lewis and Company, Limited, London. Pp. xi plus 402, with 60 illustrations. Price, 10s. 6d.

THE two earlier volumes of this series have been deservedly popular, so much so that the publishers considered it advisable to publish second editions of both—an unusual procedure with a publication of this kind. The third volume should prove equally popular. The earlier volumes dealt mainly with medical treatment and the present volume forms a useful complement, in that it deals with anæsthesia and minor surgery.

There are sixteen chapters on different aspects of treatment; the first five are general ones on such subjects as the choice of an anæsthetic in general practice, stages and signs of general anæsthesia, and the depth of anæsthesia for various operations, the last two being written by Dr. Langton Hewer of St. Bartholomew's Hospital. The next six are on special types of anæsthesia or anæsthesia for special occasions, e.g., basal anæsthesia for short operations, local anæsthesia, anæsthesia for dentistry and anæsthesia in midwifery. The last five chapters are again on more general subjects. The chapter on premedication is a useful one; this is perhaps the most humanitarian of recent, or comparatively recent, refinements in medical

practice, the obliteration from the patient's consciousness of the terrifying journey to the operating theatre, the often long delay in the ante-room, and the unpleasant commencement of anaesthesia.

There are twenty-seven articles on minor surgical procedures. The figures given for the treatment of burns and scalds at St. Thomas's Hospital in different periods during the last fifty years are very impressive. The mortality rate for burns has been reduced from nearly 40 per cent to 4 per cent; this last figure is of course since the introduction of tannic acid. One could almost say that it amounted to malpraxis to treat burns and scalds in any other way.

The articles all appear to be well written and in each case the subject is dealt with from a practical point of view.

CARDIOVASCULAR DISEASE IN GENERAL PRACTICE.—By T. East, M.A., D.M. (Oxon.), F.R.C.P. (Lond.). 1938. H. K. Lewis and Company, Limited, London. Pp. x plus 206, with 43 illustrations. Price, 10s. 6d.

This is the book on cardiology that we have been looking for for a long time. It is all very well for the physician who has taken out a special course and worked with the leading cardiologists in Great Britain to come back here and teach the student that percussion of the heart is liable to lead one into gross errors and that an orthodiagram should be done in every case, but the fact remains that on ninety-nine occasions out of a hundred his students, when they start practice, will have to depend on their fingers and ears for ascertaining the size of their patients' hearts, and that in India only one in every thousand or so persons dying of coronary disease dies with comfort of the electrocardiogram. We do not mean to suggest that radiography and electrocardiography are not useful procedures and we fully appreciate the fact that much of our recently-acquired knowledge on cardiology has been obtained through these ingenious devices. There is not in this volume a single electrocardiogram, but there are many cardiac outlines, which, as the author says, help one to cultivate the x-ray eye.

It is not necessary to discuss this book in detail. Modern knowledge and modern teaching in cardiology are presented to the reader clearly and concisely, and in such a way that he ought to be able to tackle a case of heart disease without any feeling of the handicap that the absence of the elaborate instruments, available only in large hospitals, might engender. The student will find that the most elementary details are included; these will help him to obtain a proper grounding in this important subject, but it is to the general practitioner in India that we can recommend this book most warmly.

THE PNEUMONIAS.—By H. A. Reimann, M.D. 1938. W. B. Saunders Company, Philadelphia and London. Pp. 381, with 111 illustrations. Price, 25s.

THERE is at the present moment every indication that in the future the history of the treatment of pneumonia will be divided into three periods—the pre-serum period, the serum period, and the M & B 693 period. One of course expects that other sulphanilamide compounds will be found that are even more efficacious, but the improvement in the mortality figures that has been effected by the introduction of M & B 693 far exceeds that which followed the introduction of specific anti-sera. This book which comes from America bears a date of only six months ago, but the references to sulphanilamide include the statement that this group of drugs plays no part in the treatment of pneumonia, though there is also a hopeful note, referring to recent animal experiments, which suggests that the future may see the introduction of some member of this group, efficacious in pneumonia. Medical science moves so fast in these days that the print recording the last discovery has scarcely sufficient time to dry before it is out of date.

Nevertheless, this volume is one of the best monographs on pneumonia so far published, and anyone who purchases it will have no difficulty in grafting new

knowledge on the treatment and prognosis of this disease on to the sound pathological, bacteriological, biochemical, symptomatological, and radiological groundwork that is conveyed in this book.

We can strongly recommend this book to those interested either in chest disease in general or in pneumonia in particular.

INTERNAL MEDICINE: ITS THEORY AND PRACTICE.—In Contributions by American Authors. Edited by J. H. Musser, B.S., M.D., F.A.C.P. Third Edition. 1938. Henry Kimpton, London. Pp. 1428. Illustrated. Price, 45s.

THE object of the eminent American contributors of this book is to bring out the important features of medicine, so that the reader may understand the basic facts of disease. No attempt has been made to make the book a comprehensive encyclopædia of the subject—a task impossible in a one-volume work.

The book is divided into four parts; part I deals with infectious diseases, part II, systemic diseases, part III, diseases of nutrition, allergy, metabolism, physical and chemical agents, and part IV, diseases of the nervous system. The last includes the mental diseases in addition to the organic diseases of the nervous system.

Each disease has been dealt with under the usual headings, viz, definition, history, incidence, aetiology, pathology, symptomatology, diagnosis, differential diagnosis, prognosis and treatment. Each heading contains a concise exposition of the modern conception of the subject, and the outstanding features of the various diseases have been well described.

General practitioners would have welcomed more detailed description of at least some of the commoner diseases; e.g., no mention is made of the 'atypical' varieties (apical, central, massive and other varieties) of lobar pneumonia. The description of clinical features and treatment of blackwater fever is meagre and inadequate. The authors have in some instances described treatment in its barest outline, without going into details, e.g., in the treatment of streptococcal infection mention only is made of sulphaurilamide compounds and no details as to their dosage, or dangers and precautions in their use have been given. There is no mention of chrysotherapy in the treatment of pulmonary tuberculosis. In the treatment of kala-azar, the author has only mentioned neostibosan and urea stibamine as useful preparations, but no details of dosage or course of treatment with these have been given, though he has written elaborately on sodium and potassium antimony tartrate, the drugs that are becoming obsolete in the treatment of this disease. The chapter on diseases of the blood should contain a section on tropical macrocytic anaemia, and a modern classification of anemias.

The undergraduate medical student will however find this book valuable. He will learn the important features of the various diseased states including the pathologic physiology and the mechanism of production of symptoms and signs. Understanding of these fundamentals will make the comprehension of medicine relatively easier to him.

The get-up, printing and illustrations are excellent, and bear testimony to the high standard maintained by the publishers.

P. C. S. G.

THE PHYSIOLOGY OF ANÆSTHESIA.—By Henry K. Beecher, A.B., A.M., M.D. 1938. Oxford University Press, London, New York, Toronto. Pp. xiv plus 388. Price, 17s. 6d. Obtainable from Oxford University Press, Bombay and Calcutta

The book under review deals chiefly with the theoretical aspects of anaesthesia.

It is an attempt on the part of the author to interpret the various clinical manifestations and other systemic reactions during anaesthesia with almost all the known anaesthetic agents, and to correlate them as far as possible with experimental findings.

In his endeavour to do so almost all the material available up to date has been collected and placed at

the disposal of the reader. To realize the vast amount of literature that has been consulted one has only to glance over the forty-five pages of useful and well arranged bibliography at the end of the book.

The use of rectal avertin or barbiturates has been rightly condemned because of the 'fact that the lethal dose of these agents is worryingly near the clinical dose'. Because of the 'harmful cardiac effects similar to those of chloroform' general anaesthesia with ethyl-chloride has also been deprecated.

In a work which deals so exhaustively with the pharmacological aspects of practically all the drugs used as anaesthetics and pre-anaesthetics, pentothal receives scant attention and scopolamine and paraldehyde—two widely used agents in premedication—find no place.

The author's apology in writing this book is mainly to supply a reference work particularly for those who want 'to explore the controversial fields of anaesthesia'. Looked at from that standpoint the book is certainly a good one and of great help to a research worker.

M. C. G.

MODERN SURGICAL TECHNIQUE.—By M. Thorok, M.D., K.L.H. (France), K.C. (Italy). 1938. Published by J. B. Lippincott Company, Philadelphia and London. Volume I:—General Operative Consideration, Surgery of the Head and Neck and Plastic Surgery. Pp. xiii plus 526 plus xix. Volume II:—Surgery of Nerves, Vessels, Bones, Surgery of Breast and Chest. Pp. vii plus from 527 to 1229 plus xxv. Volume III:—Abdominal Surgery, Hernia, Genito-Urinary and Gynaecologic Surgery. Pp. viii plus from 1230 to 2045 plus xxix. Complete in three volumes with 2,174 illustrations. Price, £7-10 per set of three volumes. Not sold separately. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 100

This important new treatise on operative surgery successfully achieves a dual purpose; it describes in detail not only the common operations of surgery, but also the technique of many new methods. The author also carries out the promise made in the preface to describe the 'classical' operations of surgery, a lead that more than one standard textbook of operative surgery would do well to follow.

The first volume opens with chapters which discuss broadly the patient before and after operation, surgical equipment, and anaesthesia. The figures illustrating the section on regional anaesthesia are specially noteworthy. The second part of this volume is devoted to the surgery of the head and neck, much space being given to new work on the skull and brain, especially the work of Krause.

Orthopaedic surgery occupies much of volume II. In the section on tendon transplantation operations on the lower limb are minutely described, but no space is given to operations about the wrist. This is a pity because, owing to the use that can be made of the synergic action of the flexors and extensors of the wrist, better functional results can be obtained in this joint than in the joints of the lower limb.

It is disappointing to find no mention of the use of the Smith Petersen pin in the treatment of fractures of the femoral neck, a procedure that has found world-wide acceptance.

The work of Lorenz Böhler has won even more important recognition, but his methods receive no attention in this book.

The section on the surgery of the thorax is full of much new work and makes most interesting reading. In this part will be found a reproduction of Meyer's illustrated description of pulmonary embolectomy with which every surgeon should be acquainted.

Volume III describes abdominal and genito-urinary surgery, an operation of special interest being the author's method of electro-surgical obliteration of the gall-bladder.

The book, though over two thousand pages in length, is easy to read, a feature being the printing of

important passages in heavy type. Moreover errata are almost absent, although in future editions we hope to see corrected the passage that states that the thyroid gland receives its blood supply from the 'superior thyroid, middle thyroid, and inferior thyroid'. (Vol. I, p. 437.) Also, surely figures 2085 and 2108 have been accidentally turned on their sides?

Certain gems of 'neo-grammar' appear, such as 'skeletonize', 'extra-peritonealization', 'ascitization', and 'cholecystelectrocoagulectomy'. It is no use; we shall have to submit to this eventually but we shall go down fighting.

Though modestly described as succinct by its author, this is undoubtedly a major work, and destined to take an important place beside the other comprehensive textbooks on surgical technique.

W. McN. N.

DISEASES OF THE CHEST AND THE PRINCIPLES OF PHYSICAL DIAGNOSIS.—By George W. Norris, A.B., M.D., and H. R. M. Landis, A.M., M.D., Sc.D. Sixth Edition. 1938. W. B. Saunders Company, Philadelphia and London. Pp. 1019, with 474 illustrations. Price, 45s.

This volume of 1019 pages, with 474 illustrations, has been written by two former professors of clinical medicine in the University of Pennsylvania, special sections on diseases of the bronchi, lungs, pleura and diaphragm, transmission of sounds through the chest and electro-cardiography and the cardiac arrhythmias, including x-ray study of the heart and great vessels being contributed by specialists in the respective subjects. It is unfortunate that one of the authors (Dr. Landis) died before the present edition could be put through the press. The book is dedicated to the authors' mutual friend, Dr. Fetterolf, who was responsible for the many frozen sections of organs with illustrations of which the book is adorned.

Many will agree with the authors in the view that with the increasing use of laboratory methods, which are frequently necessary and sometimes essential to accurate diagnosis, the importance of the clinical methods of the diagnosis of heart and lungs in health and disease is being neglected. To explain and emphasize these methods in their proper perspective with the help of up-to-date knowledge at our disposal, the authors have published this treatise for the use of senior medical students and doctors. And we must say that they have succeeded in their effort.

The book is divided into four parts. Part I deals with the examination of the lungs and the interpretation of normal sounds and their variation from the same. The chapter on the transmission of sounds through the chest is specially interesting. The normal variations of percussion and auscultation sounds have received special attention. We are, however, sorry to notice that the usefulness of radiology in the diagnosis of pulmonary conditions has not received as much attention as it deserves, not even in the investigation of the diseases of children. This has been rectified in the case of the circulatory system dealt with in part II, which deals with the examination of the circulatory system, including electro-cardiography and x-ray study. Vital capacity, functional tests, basal metabolism, the effort syndrome and other additional methods have been described. Part III deals with diseases of the bronchi, lungs, pleura and diaphragm. Part IV deals with diseases of the heart, including the pericardium, coronary arteries, and thoracic aorta.

The present edition has been thoroughly revised and brought up to date, the portions dealing with bronchial asthma, bronchiectasis, lung abscess and cystic disease and the relations of nasal and accessory sinus disease to infections of the lower air tract being completely re-written.

We commend the book particularly to teachers of medicine. The reproductions of frozen sections, photographs and diagrams leave nothing to be desired. The printing and get-up reflect credit on the publishers.

A. C. U.

YAWS. (FRAMBOESIA TROPICA).—By H. D. Chambers, M.B., Ch.B. (Aberd.). 1938. J. and A. Churchill Limited, London. Pp. xiv plus 169. Price, 5s.

THE author makes a bad start, for the naïveties of his preface must fill the average reader with misgivings. This preface contains the following surprising and totally irrelevant paragraph:—

'Gonorrhoea is prevalent because so few heed the teachings of the Church regarding marriage. Perhaps, some day, stringent legislation against illegitimacy will effect a diminution in the incidence of the disease. Such legislation would also be a step towards rescuing from malnutrition and disease many children born out of wedlock'.

Then, when he does get to the subject of the book he makes this penetrating observation on the epidemiology.

'The disease is confined to the damp areas of the island where living conditions are unhygienic. In parts of the island where conditions are not conducive to the disease yaws is almost unknown'. He concludes his preface by mentioning that the book is written for members of parochial boards and ministers of religion, amongst others, of course.

The book itself does however do something to dispel, or shall we say mitigate, this bad impression. The historical descriptions are interesting and there are many details not found in ordinary textbooks. The reference in the foreword to the book being 'eminently readable' cannot however be upheld as never has any book caused the reviewer's editorial pencil to itch so continuously.

The writer's sense of uniformity is entirely undeveloped. On p. 37 the causative organism is given as *Spirochæta pertenuis*, on the next page as *Spirochæta pertennis*. A few lines further down we are back to *Spirochæta pertenuis* (yaws germs); on p. 41 it is again *Spirochæta pertennis* (yaws germs) and on p. 42, it is again *Spirochæta pertenuis*. Strict alternation seems to have been observed. On p. 1 it is *Treponema pertenuis*, on p. 21 *Treponema pertenuis*, and on p. 76 *Treponema pertennis*.

His grammar is usually correct but some of his sentences just haven't any meaning. 'These three places, however, have a very heavy rainfall, and by reason of their proximity to the sea do not fall in any season much below their mean annual temperature' as a sentence doesn't make sense nor is it correct in fact or implication, and 'The Wassermann reaction test of blood withdrawn from the arm in patients with yaws lesions begins to give positive results around the third and fourth week after infection with *Spirochæta pertennis*'.

The author's strong point is not either geography or climatology. He has an *idée fixe* regarding high temperature, humidity and yaws endemicity, and if geographical facts don't fit in with this, well, they just have to be altered.

He refers to the North-West Frontier Province on being 'more or less' on the same latitude as Burma. 'More or less' is a wide term, but Peshawar is as many degrees north of the central point of Burma, as the Arctic circle is north of Manchester, and he places Lower Chindwin in Assam.

Technical expressions are used freely, often too freely we should imagine for the composure of some members of parochial boards, and the parenthetical explanations are not always very helpful, e.g., 'Wassermann reaction (blood test)', varied by '(blood test result)' and on the same subject 'The titre (indication of impurity)'; this is presumably for the benefit of ministers of religion.

The author has had such exceptional experience and there is so much good in this book that the reviewer would recommend him, first to make up his mind whether he wants to write a popular book or a serious contribution to medical science, and then, whichever course he has decided upon, to sit down and rewrite the whole book.

L. E. N.

THE PRACTICE OF REFRACTION.—By Sir Stewart Duke-Elder, M.A., D.Sc. (St. And.), Ph.D. (Lond.), M.D., Ch.B., F.R.C.S. Third Edition. 1938. J. and A. Churchill, Limited, London. Pp. xv plus 371, with 183 illustrations. Price, 12s. 6d.

THIS is the third edition of this book and retains the essential character of preceding editions in that it aims to be a simple clinical guide for the student and the practitioner in the prescribing of spectacles, without hindering him with innumerable mathematical proofs.

The book consists of 371 pages divided into six sections. The first section deals with eye-strain, the second with the principles of refraction, the refraction of the eye, the anomalies of refraction and the changes in refraction; the third section deals with accommodation, convergence, presbyopia and the anomalies of accommodation. Section four deals with orthophoria, heterophoria and heterotropia. Section five deals with the general outline of ophthalmological examination, the visual acuity, ophthalmoscopic examination, retinoscopy and the subjective verification of the refraction and the testing of the muscular equilibrium. Section six deals with the making and fitting of spectacles.

Finally there are six appendices which deal with the refractive indices, a table showing the equivalents of centradis in prism dioptres, in degrees of deviation and in degrees of refracting angle, metre angles, lenses of the same effectivity for near and for distant work, the formulae for periscope lenses and the official visual requirements.

The author very wisely points out the art of refraction cannot in any sense be learned by reading a textbook and that the only way of attaining efficiency is by constant and careful work in the refraction department of an eye hospital where large numbers of cases of all kinds are available and where the findings of the young refractionist can be supervised.

In the new edition some new matter has been added, dealing particularly with such problems as aniseikonia, muscular imbalance, dynamic retinoscopy, orthoptic exercises, contact glasses and so on.

The book is well illustrated and written in a clear simple style. We recommend it to all medical men interested in ophthalmology as a most useful book for their library.

E. O'G. K.

SHOCK AND RELATED CAPILLARY PHENOMENA.—By V. H. Moon, A.B., M.Sc., M.D. 1938. Oxford University Press, London. Pp. xviii plus 442. Illustrated. Price, 21s. Obtainable from Oxford University Press, Bombay and Calcutta

THE elusive problem of the phenomena of shock has a fascination of its own. In a foreword, Dr. W. B. Cannon commends the new aspect of Dr. Moon's explanation which embodies a comparison with pathological processes obtained, for example, in cholera, certain toxæmias and infections. This monograph may, therefore, be regarded as a complete survey of recorded studies on shock; it has the added advantage of having been investigated from the pathological standpoint.

There are twenty-three chapters in this book and an appendix containing practical considerations. The first four chapters deal with the minute anatomy, reactions and permeability of capillaries and give a clear explanation of dilatory actions, formation of lymph and the triple response. The view of Lewis is quoted that 'whenever the skin displays an acute reaction in the form of the triple response this reaction is provoked by H-substance'... a single substance believed to be closely related to histamine. In the subsequent chapters there is a careful consideration of the theories concerning shock, 'locus minoris resistentiæ' and traumatic toxæmia. Shock has been defined as a 'circulatory deficiency, neither cardiac nor vaso-motor in origin, characterized by decreased blood volume, decreased cardiac output (reduced volume flow) and by increased concentration of the blood'. The diverse

conditions under which shock may be expected to occur, and the contributory factors, have been carefully analysed. The analogy of cholera is of particular interest to us in this country. Probably no disease results in circulatory collapse more quickly than is seen in severe cases of cholera. Crowell's experience of 92 post-mortem examinations in the Philippine Islands is worthy of note. He described many of the features characteristic of shock and these were confirmed later by MacCallum. With regard to treatment of shock, two excellent principles are enunciated; Frazier said, 'Begin the treatment of shock before its onset'. While Crile is of the opinion that 'the best cure for shock is prevention'.

We have only one criticism to offer against this excellent monograph. Animal experiments, we concede, are indispensable for the progress of science but there must be some limitation to brutality. 'Dogs under barbitol anaesthesia were rigidly encased in a plaster of Paris cast and one side of the animal was then burned with a Bunsen flame applied through windows in the plaster case. The bodies were bisected longitudinally and the weights of the two sides were compared'. At least six such experiments are recorded (p. 146) although it is obvious that they include an inevitable factor of error. Experiments such as these bring discredit to the medical research worker, and it is surprising that this point escaped the vigilance of the Oxford University Press. The printing, get-up and illustrations are excellent and a useful index is appended. There is also a complete bibliography on the subject.

P. N. R.

PRACTICAL OTOTOLOGY, RHINOLOGY AND LARYNGOLOGY.—By A. E. Schlanser, M.D. 1938. Henry Kimpton, London. Pp. 315. Illustrated with 81 engravings. Price, 21s.

WRITTEN by a Colonel of the United States Army Medical Corps, this book is primarily intended for the use of medical officers in that corps. However, the practical way in which each subject has been presented will have a wide appeal, especially to house surgeons and clinical assistants in ear, nose and throat departments.

The book begins with suggestions for a systematic and rapid method of case-taking and examination of a patient, and then describes the commoner conditions of the ear, nose and throat from the clinical aspect, with notes on their treatment.

Each subject is described in simple terms, unencumbered with vague alternatives or theorizing. As a result the book tends to be dogmatic in many places, but this does not detract from its value in any way; in fact the reader is inspired by a feeling of confidence in what is laid down.

The concluding chapter gives a list of instruments required for various operations. If this is the authorized equipment in the U. S. Army, our military specialists should turn green with envy.

W. McN. N.

DISEASES OF THE NOSE, THROAT AND EAR: MEDICAL AND SURGICAL.—By W. L. Ballenger, M.D., F.A.C.S., and H. C. Ballenger, M.D., F.A.C.S. Seventh Edition. 1938. Henry Kimpton, London. Pp. 1030. Illustrated with 576 engravings and 30 plates. Price, 50s.

THE new edition of this well-known book has been brought thoroughly up to date and is more worthy than ever before to be considered among the important standard textbooks on diseases of the ear, nose and throat.

In its new form the book has become appreciably enlarged through the introduction of new material; but whatever has been added has passed beyond the 'experimental' stage, and is worth careful notice.

Much of interest is to be found in the section on the paranasal sinuses, and the problem of surgical treatment of maxillary sinusitis receives special attention. In another section of the book diathermy and radium

are recommended for treating malignant tumours of the antrum.

In the section on diseases of the ear there is so much that is excellent that it is difficult to pick out portions for comment. In recent years there have been many advances in otology, and all the important ones will be found incorporated in the text. The chapters on petrositis and labyrinthitis adequately sum up the present state of knowledge on these conditions, references to the literature being given in footnotes.

Mechanical aids to hearing are not described.

The concluding chapters on endoscopy have been written by Tucker and Chevalier Jackson, and form a fitting conclusion to an excellent book.

W. McN. N.

DISEASES OF THE NOSE, THROAT AND EAR.—By W. W. Morrison, M.D. 1938. W. B. Saunders Company, Philadelphia and London. Pp. 675. Illustrated. Price, 25s.

THERE is no lack of textbooks on diseases of the nose, throat and ear, and yet the student of limited means may have some difficulty in choosing a book of moderate price and size that is sufficiently comprehensive for his needs.

Here is a book, written by an able teacher of generations of students and post-graduates, that should find instant favour.

Each section opens with a short description of the applied anatomy and physiology of the parts concerned, but the author wisely omits many of the finer details, referring the reader to the standard textbooks on these subjects.

The importance of correct technique in physical examination is recognized, and a chapter on this is to be found in the early part of each section of the book.

The various common conditions of the ear, nose and throat and their treatment are described in the usual way. The subjects are illustrated throughout by numerous really excellent line drawings executed by the author, and if any deserve special mention they are those in the chapters on diseases of the ear. Too often the aural theatre is, to the new student, a dark arena wherein may be perceived the flashing of headlights and the sound of tapping. But, once having studied the figures illustrating the operations on the ear, he should have no difficulty in appreciating what is going on.

The text is free from errors, and reading is made easy by clear type printed on good paper.

W. McN. N.

PARENTERAL THERAPY: A READY REFERENCE MANUAL OF EXTRA-ORAL MEDICATION FOR PHYSICIANS, DENTISTS, PHARMACISTS, CHEMISTS, BIOLOGISTS, NURSES, MEDICAL STUDENTS AND VETERINARIANS.—By W. F. Dutton, M.D., and G. B. Lake, M.D. 1936. Baillière, Tindall and Cox, London. Pp. x plus 386. Illustrated with 90 half-tones and line engravings. Price, 34s.

IN this book the authors have dealt with the subject of extra-oral medication, the methods of such therapy and the various preparations used parenterally.

The book is divided into three parts: part I deals with the general technique of parenteral therapy; part II is the therapeutic index and part III, the pharmacological notes. The first part contains the technical details of various methods of parenteral therapy, viz, those of giving injections, intradermal, subcutaneous, intramuscular, intravenous, intra-peritoneal, intracardiac, etc.; blood transfusion; puncture of the pericardium, artificial pneumothorax; lumbar, cisternal and intraventricular puncture and injections; intravenous, infiltration and spinal anaesthesia; injections into different nerves; injection treatment of varicose veins, haemorrhoids and also of hydrocele, hernia, bursae and naevi; administration of medicine by inhalation and ionic medication. Each subject has been dealt with in a thoroughly practical

and easily comprehensible manner. Difficulties and complications that might arise have been described.

The book is profusely illustrated and the illustrations are of practical value in helping the reader to follow the text and in explaining the technique of different procedures. The techniques described are those that the authors or other eminent specialists in the field have found to be most practical.

The therapeutic index and the pharmaceutical guide contain information which the general practitioner will find very useful. The pharmaceutical guide contains the pharmacological action of the various proprietary preparations used parenterally.

The book is very well written and we can strongly recommend it to medical practitioners and house surgeons or physicians of hospitals.

R. N. C.

ALCOHOL AND HUMAN LIFE: BEING PARTLY A REVISION OF 'ALCOHOL AND THE HUMAN BODY', BY THE LATE SIR VICTOR HORSLEY AND THE LATE DR. MARY STURGE AND OTHERS.—By C. C. Weeks, M.R.C.S., L.R.C.P. Second Edition. 1938. H. K. Lewis and Company, Limited, London. Pp. xi plus 455. Illustrated. Price, 6s.

The second edition of this book deals in very great detail with the intensely important sociological problem—alcohol as a drug of addiction. Dr. Weeks has been very conscientious and painstaking in his comprehensive survey of the problem and the fruit of his labours is characterized by arriving at definite conclusions supported by the available scientific data and statistics. The book not only deals with the physiological and pathological manifestations of indulgence in alcohol but also the legal aspects of the problem and the question circling round the taking of alcohol by motor-car drivers has been exhaustively described. The sections dealing with the use of alcohol in medical treatment, effects of alcohol on the nervous system, alcohol as a food, alcohol in the tropics, the menace of the cocktail are particularly instructive. The influence of alcohol on national life has been well surveyed and the author's contentions with regard to the deleterious effect of alcohol on the expectation of life has been supported by reference to life-tables and death rates.

The volume is well written and will serve as a book of reference to medical men interested in the problem and social workers who wish to bring before the public the harmful effects produced by alcohol.

R. N. C.

CHRONIC INTESTINAL TOXÆMIA AND ITS TREATMENT: WITH SPECIAL REFERENCE TO COLONIC THERAPY.—By James W. Wiltse, A.B., M.D. 1938. Baillière, Tindall and Cox, London. Pp. xii plus 268. Price, 13s. 6d.

ATTEMPTS have been made from time to time to incriminate stasis in the large intestine as the cause of chronic ill health but the medical profession has been rather sceptical in accepting this theory. Colonic lavage as a form of treatment has come into and gone out of favour on several occasions. Dr. Wiltse is an advocate of this form of treatment. His book, although it is probably the best written argument for the theory of chronic intestinal toxæmia, still falls far short of being convincing and satisfying. The author insists that the benefits of colonic lavage do not result from the emptying of the bowel but from 'the healing of inflamed and injured tissues, the restoration of normal mechanical and cellular function, the improvement of both capillary and lymphatic circulation and of liver function'. He also considers that the use of the enema should be strongly deprecated. The author's contention that the use of enemas tends to undo all the benefits that are derived from colonic lavage is difficult to understand although it is quite understandable that an enema cannot take the place of colonic irrigation.

The book is divided into two parts, a treatise on the anatomy of the colon and a description of the various methods of performing the lavage. So far as

the practical side of the question is concerned the author's statements are clear and easily comprehensible. It is when he approaches the theoretical background that he fails to carry conviction. The sections dealing with focal and systemic infection, bacterial and food allergy and mechanical and miscellaneous causes, all of which are illustrated with cases, will interest medical practitioners.

We are of opinion that although the case for colonic lavage still remains undecided, Dr. Wiltse's book is very interesting and it is hoped that it will be studied by those who are interested in the problem of intestinal stasis and its treatment by colonic irrigation.

R. N. C.

CLINICAL PÆDIATRICS (THE BABY).—Edited by W. R. F. Collis, M.A., M.D., F.R.C.P., F.R.C.P.I., D.P.H. 1938. William Heinemann (Medical Books), Limited, London. Pp. xi plus 460. Illustrated. Price, 21s.

This book has been written by Dr. W. R. F. Collis the paediatrician to the Rotunda Hospital, in collaboration with some of his colleagues and also other experts in charge of the various special departments of the important hospitals of Ireland. In a book of this nature, he has confined himself only to such conditions as are, in practical life, likely to face any medical man in dealing with small babies from their birth up to one year of life but leaving out of consideration diseases of the childhood period. He has also included some of the important features in connection with the neo-natal period, such as infant mortality and child welfare organizations.

As we can expect from Dr. Collis and his collaborators, the various morbid conditions to which small babies are susceptible have been dealt with from all points of view in a practical, up-to-date and scientific manner. This has been possible because of the writers' accumulated experience in one of the largest children's hospitals in the British Isles. An important feature of the book is that description and management of all possible disorders in the baby have been included and this has enormously increased its usefulness to the general practitioner who will be able to manage his little patient without having to call in a specialist.

Every chapter begins with a protocol of the subject-matter to be dealt with, a very useful and convenient summary. It is difficult to criticize any particular subject and the chapters on nutrition, vitamins, gastro-intestinal disorders, tuberculosis, infectious diseases and ophthalmic disorders are excellent. The section on diseases of the skin is specially commended not only for its wealth of useful information but also for the plethora of illustrations to help the student and the practitioner. The last good word on the book is in connection with the charts and tables which will no doubt be of great help for rapid differential diagnosis.

The reviewer feels it his duty to draw the attention of the writer to a few points which have come to his notice. In discussing the treatment of diphtheria, more detail regarding serum treatment might have been given. His statement of a 'minimum therapeutic dose of 4,000 units' is unfortunate and 'the injection of a single large dose of 60,000 units intramuscularly' in a baby is certainly not 'convenient' as written by the author. Again, 10,000 units can hardly be considered adequate for a case of nasal diphtheria. Adenitis in diphtheria may be due to toxic absorption but that the severe involvement of the glands is due to secondary invasion by streptococcus hæmolyticus is an accepted fact. In discussing the causes of convulsions, many important ætiological factors have been omitted. While he has taken great pains to mention rarities like insulin hypoglycæmia as a cause of infantile convulsion common conditions like gastro-intestinal irritations have been left out. In the same chapter the author writes of 'Königs sign' for meningitis though in all probabilities he means Kernig's sign. Although Dr. Collis has attempted to confine his book to small babies he has not been able to avoid the temptation of

taking up bigger children for his descriptions. This weakness of the author is betrayed in many places both in the text and also in his illustrations. Lastly the inclusion of only a few references in the last page of the body of the book does not seem to have added much to its scientific value.

The above comments do not in any way lower the value of this book in the estimation of the reviewer who considers it an excellent British production and a very valuable one for students and practitioners.

M. N. D.

PRACTICAL PHARMACY—INCOMPATIBILITY AND PRESCRIPTION WRITING.—By B. Roy, L.M.F. Second Edition. 1936. Published by the author (Demonstrator of Materia Medica, Dacca Medical School). Pp. x plus 272. Illustrated. Price, Rs. 2-8. Cloth bound Rs. 2-12

IN this book an attempt has been made to present the subject of incompatibility and dispensing in a clear, comprehensive and concise manner for the students going up for the licentiate and compoundership examinations of the State Medical Faculty. The book is well written, is easily comprehensible and is well printed. The first part of the book deals with methods of dispensing and the second part contains a list of drugs with their composition, solubilities and incompatibilities. The art of writing prescriptions is very important and the author has tried to explain in the last chapter the form in which prescriptions are generally written. It is hoped that the book will prove of assistance to the class of students for whom it is intended.

R. N. C.

'THE PREVENTION OF MALARIA INCIDENTAL TO ENGINEERING CONSTRUCTION'.—By H. W. Mulligan and M. K. Afridi. Health Bulletin No. 25, Malaria Bureau No. 13. Pp. 52, with 11 figures and 8 photos. Government of India Press, New Delhi. Price, 7 annas

At the fourth International Malaria Congress last autumn held at Amsterdam, the late Director of the Malaria Survey of India, Colonel Sinton, closed a discussion with the plaint that we are always talking about *controlling* malaria, instead of *preventing* it by controlling engineers and cultivators.

The *Bulletin* under review summarizes briefly but succinctly the major points in which the malarious activities of the engineer and the cultivator require controlling. It is written in medically non-technical language, and after consultation with three highly placed engineers, two in this country and one in Malaya, the latter being one of the few countries of the world where the engineer has long been thoroughly controlled!

With every word of the *Bulletin* we are in complete agreement, and would like to see a copy of it on the desk of every civil engineer in this country. A study of the work would save endless acrimonious discussions and much explanation by those responsible for the health of engineering projects. That engineers will listen, and can be convinced, the reviewer knows, as witness the chief engineer's circulars regarding work in malarious zones in force on the railway to which he is malariologist.

In connection with borrow-pits, rightly described as the most universal and most dangerous of all the works of man which have a direct influence on the incidence of malaria, the engineer can take refuge from some of the strictures passed upon him by allocating the blame to the accounts officer. Field measurement books have to be produced in paying for excavation, and so arise 'the chains of borrow-pits each separated from the other by a narrow wall of earth'. To interfere with the accountancy of Government is to indeed trespass on holy ground, but a revision of the code in this matter should not be beyond the wit of man to devise, though the existing code has probably been compiled so as to be as nearly fraud-proof as possible.

Both with road and railway construction, especially with the latter, the per-mile cost must be kept within

a certain figure, else financial justification for the project cannot be arrived at. By what proportion the construction of a railway to avoid making it non-malarious would be increased does not seem ever to have been worked out. Until the engineering profession will make such a calculation and find if it can be used in their own defence, they must continue to lie down to the type of stricture passed upon them by malaria control workers generally, and the authors of this *Bulletin* in particular.

R. S. W.

KER'S MANUAL OF FEVERS.—Revised by Frank L. Ker, B.A. (Cantab.), M.B., Ch.B. (Edin.). Fourth Edition. 1939. Oxford University Press, London. Pp. xi plus 354. Illustrated. Price, 12s. 6d. Obtainable from Oxford University Press, Bombay and Calcutta

THIS book has now gone through a number of editions and has always been popular with the student in Great Britain. Its usefulness in India is naturally limited. The 'fevers' that are dealt with are not the ones that first spring to the mind when the word 'fever' is used in this country, but we are beginning to realize that all these fevers do occur in India much more commonly than was supposed a few years ago. Fifty years ago, treatises were written in this journal on why only British and not Indian troops suffered from typhoid fever. Enteric is now recognized as one of the commonest causes of fever amongst the indigenous population. Again, measles is often a troublesome epidemic amongst labour forces, and in the hill stations in India scarlet fever and diphtheria are as common as in any community in Europe.

The high standard of the previous editions has been maintained, and both practitioners and students will find the book very useful.

PERSONALITY DEVELOPMENT AND SOCIAL CONTROL IN TERMS OF CONSTITUTION AND CULTURE.—By Ira S. Wile, M.S., M.D. (Three lectures at the Tavistock Clinic, July 1937.) 1939. Oxford University Press, London. Pp. 57. Price, 3s. 6d. Obtainable from Oxford University Press, Bombay and Calcutta

THIS small book is composed of three lectures with the following titles:—

1. Personality in terms of constitution.
2. Personality in relation to culture.
3. Social control and prevention of personality disorders.

They were delivered in England by this well-known American psychiatrist and student of social problems.

They deal with the effect of the environment on the behaviour of the individual and hence on the reactions of the community as a whole, and are based on persons living under European conditions so they are perhaps not fully applicable to a country such as India where the widely different social customs and religious beliefs from those of Europeans excite a correspondingly different set of reactions.

Much that these lectures contain is, however, capable of general adaptation to any race so that their perusal will be of value to social workers anywhere in the world.

THE ESSENTIALS OF MODERN SURGERY.—Edited by R. M. Handfield-Jones, M.C., M.S., F.R.C.S., and A. E. Porritt, M.A., M.Ch., F.R.C.S. 1938. E. and S. Livingstone, Edinburgh. Pp. xv plus 1126, with 501 illustrations. Price, 30s. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 20

TEXTBOOKS tend to run in cycles. There is a sudden spate of textbooks on some subject, then a period when these books run through numerous editions, or drop out of use, and the cycle starts again. This is natural, as in time writers find that it is difficult to fit the new material into the old frames.

Messrs. Handfield-Jones and Porritt consider that the time has come for a new textbook on surgery. Those

already in use are either frank cram books for the medical student or too pretentious tomes of many volumes for the use of the specialist. Whilst we cannot agree that all the current books on surgery fall into one of these two classes, we do consider that the authors have made a reasonably good case for the very serious step they decided to take (i.e., burdening the medical library with another book) and the result has fully justified their decision, namely, to produce a book that, whilst not being too large for the undergraduate student, will supply the student for higher degrees with the basis of his surgical knowledge, and finally be useful as a reference book to the practitioner.

Another point in favour of this book is that the authors, by writing the major portion of the book themselves have, achieved the homogeneity so desirable in a textbook, and yet have escaped the charge of omniscience and have added authoritative weight to this book by obtaining the collaboration of thirteen of their specialist colleagues. These include Dickson Wright of St. Mary's Hospital who writes on diseases of the brain, McElligott on venereal diseases, A. W. Matthew on anaesthetics, Walter Howarth on affections of the nose and sinuses, Lionel Colledge on diseases of the ear, pharynx and larynx and Tudor Edwards on diseases of the chest, lungs and pleura.

Knowledge of the local and special anatomy and pathology are an essential prelude to the full comprehension of any surgical disease and its correction; these aspects are given their due prominence in each chapter of the book. Special examinations, such as radiography, are given their place but are not over-emphasized; in fact the emphasis throughout the book is on clinical observation.

The book is well illustrated and almost without exception the illustrations are relevant and show clearly what they are meant to show; this is by no means always the case in textbooks. The publishers have produced an excellent book which is not too bulky despite its thousand odd pages of firm and completely opaque paper; the print is clear and the volume opens flat. It is a book that we can unhesitatingly recommend to the student and practitioner in India.

SURFACE ANATOMY.—By W. E. Roberts, M.R.C.S., L.R.C.P. 1937. Angus and Robertson Limited, Australia (89, Castlereagh Street, Sydney). Pp. x plus 93. Illustrated. Price, 7s. 6d.

A good book on surface anatomy is part of the necessary equipment of a medical student. If he is wise he will take great care of his copy and keep it for reference for the rest of his life.

The present volume is a good example of its class and has some outstanding features which give it special distinction, amongst these are that the full explanatory text of each figure is to be seen on the page on which the figure appears, or on the opposite page; this obviates frequent turning of pages.

The Birmingham-Revision nomenclature is used, but in places the Basle and even the old nomenclature are given in brackets.

The book is printed in Australia and is a credit to Australasian publishing.

In fairness to our reviewer, it should be stated that though this book was published in 1937, we only received our review copy on 27th March this year.]

HYGIENE.—By J. R. Currie, M.A. (Oxon.), M.D. (Glas.), D.P.H. (Birm.), M.A., F.R.C.P. (Edin.). 1938. E. and S. Livingstone, Edinburgh. Pp. xiii plus 324, with 34 figures in the text. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 10

This book is a short summary of hygiene written for the medical student. The information contained in this volume is sufficient for the qualifying examinations and for university degrees, but is not meant for those studying for public health qualifications.

On the whole the book serves the purpose for which it was written, very well. Much that is included will be equally useful to the student in this country, as the

administrative and legal aspects of the subject are only touched upon in a very general way.

The information in the section headed 'infestations' will not however be of much value to the worker in the tropics, or to anyone else. The statement that 'the sandfly is a minute creature, like a tiny moth', even if we forgive the obvious misprint, doesn't really help much, and the information about cockroaches might have been much more useful, even in the space allotted.

Carbon tetrachloride only is recommended for mass treatment of hookworm disease; more recent work on the subject might have been consulted. Useful information is given in the sections on the nutritive aspects of food, but the statement that maize is a nutritious food requires qualifying.

Another criticism is that the practice of italicizing scientific names of micro-organisms and insects is only fitfully adopted.

The book should however prove very useful to the undergraduate student in India.

MY TESTAMENT OF HEALING.—By J. Ellis Barker. 1939. John Murray, Albemarle Street, W.1, London. Pp. vi plus 345. Price, 8s. 6d.

It is surprising that such books as this enjoy a wide circulation in times when the general standard of education is so greatly improved compared with the time when Hahnemann first formulated the principles of homœopathy. In those days the public were not very well informed on matters of general importance, including an outline of knowledge on medical matters, and it must also be admitted that the medical profession of that era was inclined to use much too large doses of drugs. In drawing attention to this failing Hahnemann undoubtedly performed a service, as a more carefully regulated system of dosage is now in vogue, and in our opinion that is the sole contribution of homœopathy to medicine.

The reviewer is possibly one of the worst possible persons to discuss a book of this nature, from the author's point of view, because he is an 'orthodox' medical man who has spent many years on scientific research, and judging from the tone of this book the ordinary 'orthodox' practitioner is bad enough, but a scientifically trained one is infinitely worse.

However, he has read the book carefully and brought to bear on it the detached attitude that prolonged scientific training enables one to assume when considering a question not in accord with one's own views. It is impossible to commence a detailed criticism for such would require as much space as the book itself so one must be content with the summing up that it is not a book that is calculated to be of much value to practitioners or the lay public whatever form of the healing art they follow.

Abstracts from Reports

TRIENNIAL REPORT ON CIVIL HOSPITALS AND DISPENSARIES IN THE CENTRAL PROVINCES AND BERAR FOR THE PERIOD ENDING 31ST DECEMBER, 1937

THE triennium ending the 31st December, 1937, witnessed a slight improvement in medical relief in the province. The number of hospitals and dispensaries increased by 12 to 348. Two new hospitals were opened for women and ten dispensaries of the cheap plan type in rural areas. Although accommodation in hospitals continued to be limited there was a welcome increase in the number of beds by 206 [90]. The Provincial Government, however, recognize that medical relief in the province is inadequate, particularly so in rural areas. That there should be no more than one dispensary for over 44,000 persons or 283 square miles of area is a measure of this inadequacy. According to the present policy the provision of medical relief is primarily a matter of local concern. Experience

has shown that the present conditions of establishing new dispensaries, one of which enjoins on the local people to make a total contribution of Rs. 8,500, are onerous and the question of relaxing them is under consideration. It is, however, clear that this method has financial limitations and it cannot be hoped to take medical help to the masses in the thousands of villages in this manner. Government, therefore, propose to investigate the possibility of introducing a lay agency possessing certain minimum qualifications, which could serve as a 'liaison' between the people and the regular medical institutions. They are also contemplating the revival of the scheme of subsidizing medical practitioners to settle in rural areas. The report of the committee appointed to determine the place which the indigenous systems of medicine in vogue in the province should occupy in the scheme of medical relief provided by the State and to make proposals for deriving the maximum possible benefit from these systems has just been received and is under consideration.

There was an increase in the number of out-door and in-door patients from 8,770,842 and 36,031 to 9,919,060 and 44,290, respectively, and the number of operations performed, which is invariably an index of the popularity of medical institutions, from 18,553 to 34,667. These statistics are a clear indication of the appreciation by the public of the amenities provided by the hospitals and dispensaries in the province and of the necessity for their expansion.

Thanks to the special efforts of Colonel (now Major-General) N. M. Wilson, it was found possible to start anti-tuberculosis measures on systematic lines. Four fully-equipped clinics were opened at Nagpur, Jubbulpore, Amraoti and Raipur. Forty beds have been reserved by Government in the Pendra Road Sanatorium which is managed by the United Board of Eleven Missions. It is, however, obvious that we have merely touched the fringe of the problem and that more organized and sustained action is necessary for combating this scourge.

Another important problem, is the treatment of eye diseases. It has been noticed that there are a few well-equipped dispensaries for the treatment of minor diseases of the eye, but that the arrangements for

Dispensary Committee Hospitals was revised and the number of such nurses was increased from 5 to 12. Forty probationary nurses are under training at the four provincialized hospitals. Training facilities exist also at some of the Dufferin Fund Hospitals in the province. It is, however, unfortunate that there is still a great paucity of suitable candidates.

Although the total expenditure on medical institutions showed an appreciable increase to Rs. 41.61 [Rs. 36.71] lakhs, it still bears an unduly small proportion to the total expenditure of the province and the local bodies. There is vast scope for improvement in the department, but progress is hampered by lack of funds. Apart from occasional generosity from individuals, the public as a whole have not yet awakened to their responsibility in the matter. It is disheartening to find that the landlord and merchant classes who can well afford to show a little charity are found to evade the payment of even legitimate dues. It is time the public realized that the state and local bodies' hospitals are intended for the poor and that the well-to-do classes must pay for the medical treatment they receive. Local bodies must also make adequate provision in their budget for medical relief and must pay their contributions to the hospitals and dispensaries regularly. They would do well to bear in mind the suggestion of the Inspector-General of Civil Hospitals that a definite percentage of their income should be earmarked for medical relief.

SEVENTIETH ANNUAL REPORT OF THE DIRECTOR OF PUBLIC HEALTH OF THE UNITED PROVINCES FOR THE YEAR ENDING 31ST DECEMBER, 1937

In the statement below are compared the death rates per mille of the population from the most important diseases during 1936 and 1937 and the average death rates for the preceding ten years. The figures for 1937 as compared with 1936 show a decrease under all heads except 'plague', 'dysentery and diarrhoea' and 'respiratory diseases', while compared with the decennial average there is an increase under the head 'respiratory diseases' only.

Chief causes of mortality	Death rate per mille for 1936	Death rate per mille for 1937	Average death rate for preceding ten years 1927-36	Increase or decrease as compared with 1936	Increase or decrease as compared with decennial average
Cholera	0.14	0.13	0.60	- 0.01	- 0.47
Smallpox	0.30	0.07	0.22	- 0.23	- 0.15
Plague	0.15	0.50	0.61	+ 0.35	- 0.11
Fever	17.60	16.37	18.30	- 1.23	- 1.93
Dysentery and diarrhoea	0.34	0.35	0.37	+ 0.01	- 0.02
Respiratory diseases	0.89	0.92	0.79	+ 0.03	+ 0.13
Injuries	0.44	0.43	0.44	- 0.01	- 0.01
All other causes	2.75	2.61	2.76	- 0.14	- 0.15
All causes	22.61	21.38	24.04	- 1.23	- 2.66

treating serious cases are not satisfactory. Six assistant medical officers were given special training for a period of six months at the Mayo Hospital and three more are under training at present. The former have been sent out to selected places in the *mofussil* where eye centres have been established. A scheme for the establishment of an up-to-date eye hospital to be financed out of the King George V Memorial Fund is also under consideration. The C. P. and Berar Blind Relief Association is doing useful propaganda and helping the blind.

The strength of the nursing staff in all hospitals continues to be inadequate. For financial reasons most of the hospitals are not in a position to employ staff nurses. The scheme of appointing staff nurses for

Epidemic dropsy.—The total number of deaths reported from the disease during the year under review was 64 against 145 last year. Out of 64 deaths, 26 occurred in rural areas and 38 in urban areas.

The highest mortality (14) was reported from the Jhansi district, followed by Benares town with 13 deaths, Allahabad town with 6 deaths and Cawnpore town with 4 deaths. In other infected towns and rural tracts of districts the number of deaths reported did not exceed 3 in any case.

The disease was fairly widespread in the cities of Benares, Allahabad and Cawnpore and consequently an officer of this department was placed on special duty to investigate the causes of the disease in those places and to suggest suitable preventive measures.

The principal findings of this investigation are as follows:—

Benares.—The largest incidence of the disease was amongst the Bengali community although it was found to a smaller extent among the general population. It affected the poor and the middle-class people mostly. Both sexes and all ages appear to be equally affected.

The factors responsible appear to be both food deficiency and food intoxication.

Allahabad.—The disease was mostly confined to the Bengalis of middle and well-to-do classes and males and females were equally affected. Children under 10 years were affected much less than those above this age.

Sixty-five per cent of the cases studied used mustard oil from one source. The outbreak in Allahabad appeared to be more of food intoxication than of food deficiency.

Cannanore.—The disease affected all the communities but the largest number of cases were found among the Mohammedans. The disease was not confined to the Bengalis, 97.5 per cent of cases having occurred amongst United Provinces men. It affected chiefly partial rice eaters and mustard oil users but a few cases have also occurred among non-rice eaters and those who do not use mustard oil. Both vegetarians and non-vegetarians have suffered but the incidence was greater among the latter and both sexes have suffered but males are affected more than females.

Village latrines.—In the 'trench pattern' latrines that have for many years been used in the United Provinces in temporary aggregations of population, the excrement has not to be carried away. All that is necessary is to cover the trench after use by earth heaped up near it, and to dig another trench and shift the screens. The use of this type of village latrines was first recommended by this department in 1935. After two years' trial they were not found to suit village conditions, because the people were unwilling to cover up the used trenches or to touch or shift the screens from them. The trenches also got filled up in rains; the screens and partitions, which were made of straw, were sometimes blown away by winds or damaged by cattle.

In the circumstances the rural health staff have now been instructed to advise the construction of bored hole latrines, of which a large number have been constructed in the health unit in Partabgarh (U. P.), in South India and in other parts of the world. The cost of each such latrine is Rs. 5. For an ordinary family one latrine should suffice for one to three years, depending upon the nature of the soil and the number of persons using it. These latrines, if properly made, should not breed flies or give offensive smell, because of their depth. They require very little space and do not require the services of sweepers, since there is nothing to clean or take away. After the bore in use is nearly full, the latrine is required to be closed and another bore is used. After six months the material in the first bore under normal conditions should be reduced to innocuous poudrette which can be dug up and the material can be used as fertilizer. This large scale experiment is being watched carefully.

Health unit in Partabgarh district.—This scheme continues, with the financial co-operation of the Rockefeller Foundation of the United States of America. The Foundation kindly extended financial support for the sixth year of this scheme, commencing 18th July, 1937.

A preliminary survey of the health conditions in the area comprised in the unit was undertaken in 1932-33, at the commencement of this work. To judge the progress made during the period of four years, a re-survey was undertaken in 1937, which reveals remarkable progress in all directions. For instance, the number of windows and ventilators in village houses has increased by over 52 per cent and that of parapet walls over drinking water wells by over five times. The number of soakage-pits, health societies and village dispensaries now is several times that existing at the time of the original survey. A fair proportion of cattle-sheds previously situated inside the dwelling houses have been separated, excavations have been filled

up in large numbers and the vast majority of manure heaps have been removed from within the habitation. New features introduced since the inception of the health unit are 102 bored-hole latrines for individual houses. Each village in the unit now has at least one improved type of well, a standard manure-pit, an approved type of soakage-pit, an improved cattle byre and some inexpensive windows and ventilators to serve as models.

Village health leagues.—The essential condition for the success of measures designed to improve rural sanitation is the willing assistance of the people, because no health organization by itself can do all that is necessary in this respect, and to continue it for all time. Experience has also shown that if the villager contributes even a little, he will feel a personal interest in, and responsibility for making the work a success. How to secure such co-operation has been a problem. A method which is being practised in the health unit area in Partabgarh with success is to arrange through a member of the health unit staff, usually the sanitary inspector for each village to form itself into a small health organization, called a 'health league' and by means of this league to take charge of and complete a series of village health problems. The membership of the league is often the entire population of the village but it usually has a small executive committee. It is the duty of the health unit staff to provide the league with a list of the health problems of the area in due order of their importance. The leagues are advised not to carry on more than one activity at one time, and to complete each activity before attempting another. In this way the too common custom of starting too many activities at the same time and of completing none is avoided. The method is recommended to rural health workers in other parts of the province.

School hygiene and medical inspection of school children for the year 1937-38.—The detailed examination of boys was conducted in 154 out of 155 Anglo-vernacular schools in the larger municipalities where whole-time school health officers are employed. The number of boys whose medical history sheets were filled was about 17,600 out of 54,300 on roll, the enrolment having increased by about 300 since last year. Out of 460 primary and vernacular schools, 187 were visited. Ordinary examination, consisting of noting main defects, of more than 12,200 boys out of 47,200 enrolled was done. About 1,900 boys were examined as 'special cases' and over 7,400 boys were re-examined.

It has been calculated roughly that 34 per cent of all the boys examined have one defect, 13 per cent have two defects and 7.5 per cent have more than two in urban areas so that there were not less than 54.5 per cent defectives to share all the defects. These figures for rural areas are (1) 12.9 per cent, (2) 3.8 per cent, and (3) 1.7 per cent giving 18.4 per cent defectives to share all the defects.

Poor nutrition.—In the larger urban areas this defect was found in 12 per cent against 13.9 per cent in 1932. This percentage does not seem to vary much in rural areas being 18.3 per cent against 19.19 per cent and 20 per cent in 1931-32 and 1932-33 respectively. The incidence of the largest number of ill-nourished children has been in the age group of 6 to 11 years. It is in all cases due to faulty nutrition.

The scheme of free supply of milk to ill-nourished and poor children was in force in towns where the central school dispensaries existed and several school health officers have made particular inquiries and observations on the effect of milk. The total number of poor and ill-nourished boys fed on milk was 861.

The school health officer, Lucknow, reports that free supply of pasteurized milk was made to 205 students in 14 different institutions at the rate of $\frac{1}{2}$ lb. daily to each student during the school hours. The record of his observations shows a total gain of 12 $\frac{1}{2}$ lb. per 100 lb. of the body weight in students fed on milk as compared to 7 lb. in the controls. One of the schools in Lucknow realizing the importance of milk feeds to students has started its own dairy.

The school health officer, Benares, observes that where pasteurized milk was supplied free to 275 students in nine institutions with a total of 120,201 meals of $\frac{1}{4}$ seer to each student daily for an average of 20 to 60 days, 73.8 per cent of the boys gained in weight. The average gain in weight varied from 1.4 lb. to 5.9 lb.

In Agra and Cawnpore pasteurized milk was supplied free to 175 and 206 students, respectively, for short periods.

The school health officer, Shahjahanpur, has worked out a nutritional quotient to serve as a guide to the progress in the health of the school child. It is a figure arrived at by dividing the weight of the child by the height of the same individual. The nutritional quotient thus worked out for the boys in the Shahjahanpur municipality when compared with those of other countries, for example, America and England, is very much less.

TWELFTH ANNUAL REPORT OF THE RAMA-KRISHNA MATH CHARITABLE DISPENSARY, BRODIE'S ROAD, MYLAPORE, MADRAS, FOR THE YEAR 1938

THE charitable dispensary conducted by the Math was started in 1925 when Rao Sahib Dr. B. Raghavendra Rao, retired civil surgeon of Madras, placed his voluntary service at the disposal of the institution, and undertook to meet the then recurring expenditure required for the work.

The following tabulated statement of the number of patients treated since the start of the dispensary up to the current year bears ample testimony not only to the utility of the institution and the growth of its work, but also to the increasing responsibilities of the management.

Year	New number	Repeated number	Total
1926 ..	3,158	1,951	5,109
1927 ..	4,873	4,541	9,414
1928 ..	8,994	9,228	18,222
1929 ..	14,630	16,302	30,932
1930 ..	26,632	27,935	54,567
1931 ..	23,442	35,463	58,905
1932 ..	21,405	31,882	53,287
1933 ..	26,537	40,384	66,921
1934 ..	27,831	41,082	68,913
1935 ..	27,659	41,008	68,667
1936 ..	28,540	44,575	73,115
1937 ..	29,241	52,770	82,011
1938 ..	33,746	59,904	93,650

The work of the dispensary has increased and the number of patients has gone up so much that the need is felt of establishing it on a firm basis financially so that the fluctuations of door-to-door collections of small amounts may not compel us to limit our services to the poor.

We appeal to the generous public to continue their active sympathy and co-operation, and to come forward with liberal contributions for fulfilling the immediate needs of the institution. Donors wishing to perpetuate the memory of their friends or relatives may do so by creating memorial endowments for the maintenance of the charitable dispensary. A tablet bearing the names of the persons whose memory is to be perpetuated will be fixed in a suitable part of the building. Contributions, however small, will be thankfully received and acknowledged.

THE THIRD ANNUAL REPORT OF THE BENGAL OBSTETRIC AND GYNÆCOLOGICAL SOCIETY FOR 1938

THERE were altogether five clinical meetings during the year. Two of the lectures were delivered on

invitation—one by Dr. F. A. E. Crew, Professor of Animal Genetics, Edinburgh, and the other by Dr. Heyman of Radium Hemmet, Stockholm, Sweden. The remaining three lectures were delivered by members of the society. All the lectures were well attended and highly appreciated.

The following is a list of the clinical meetings held:—

1. Biological tests for the diagnosis of pregnancy by F. A. E. Crew of Edinburgh.
2. Cancer campaign in Sweden by Dr. Heyman of Stockholm.
3. An interesting case of cervical polyp by Dr. J. Chakraverti.
4. Photographic demonstrations and discussion on some interesting gynecological specimens by Drs. G. C. Nandi and S. K. Ghosh.
5. Eclampsia in Bengal by Dr. J. Chakraverti. The first of the above two meetings was held under the joint auspices of the Society and the Indian Medical Association and the second and fourth with the Calcutta Medical Club.

The third All-India Obstetric and Gynecological Congress will be held under the auspices of the Bengal Obstetric and Gynecological Society during the winter of 1939.

The executive committee takes this opportunity of reminding the members of the society that success of the Congress depends on the hearty co-operation of its members and earnestly requests their active co-operation in the matter.

Correspondence

PYOCOELE OF THE CANAL OF NUCK

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—The following may be of interest as no reference to such a condition can be found in any of the textbooks at our disposal.

An Indian girl, aged four, was admitted to hospital on 12th March, 1939, with a swelling in the anterior part of the right labium majus extending upwards in the inguinal canal; duration several months. A diagnosis was made of anterior labial hernia or hydrocele of the canal of Nuck. Cough impulse or its absence could not be elicited due to non-co-operation on the part of the child.

At operation a condition of pyocoele was found, the pus being streptococcal, and we described the condition as pyocoele of the canal of Nuck. The sac complete with purulent contents was removed. None of us have heard or read of such a condition and consider that it must be of excessive rarity especially in such a young child; but perhaps some of your readers may recall a similar case.

Yours, etc.,

H. S. SMITHWICK,
MAJOR, I.M.S.,
and

B. W. MARATHE. S.M.S.

CIVIL HOSPITAL,
SHOLAPUR,
INDIA,

14th March, 1939.

IS IT PELLAGRA?

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Going through the article on 'Notes on Cases of Pellagra encountered in Calcutta' by Sen Gupta, Rai Chaudhuri, Choudhuri, and Napier (*Indian Med. Gaz.*, March 1939) reminds me of two cases somewhat akin to the cases mentioned.

One was a case of chronic diarrhoea in an old man of 63 years—constitution weak and anæmic. Later on, he developed œdema of the feet. He was under my treatment for a month. He was then put on astringents,

emetine, diuretics, sedatives, etc., all to no effect. He then had a change of doctor. That was proved of no avail. Ultimately, he resigned himself to my treatment in despair. By accident I prescribed him marmite in a fair dose. In a week his oedema subsided and diarrhoea diminished and in course of two more weeks he was his original self with added flesh to his old cheeks.

The other was a young widow of some 26 years. She had a chronic sore and denuded tongue. She could hardly take anything. For months together she was on bland liquid diet. Glycothymolin, glycerin, and tincture of myrrh were painted to no purpose. Astringents, like argentum nitras, in a lotion were applied. This also was of no avail. Here again I chanced to prescribe her marmite. She was all right in two weeks without any relapse for the last three years.

I am at my wits' end now to know if they are to be classed as pellagra. But this much I can say, that vitamin-B deficiency causes a sort of ulceration of the gut. This was shown by Dr. D. D. Bhattacharya, M.A., of Lucknow Medical College—a research worker there—to me. He fed a lot of guinea-pigs on different avitaminous diets, and on autopsy such ulcerations were evident.

Yours, etc.,

MANINDRANATH GHOSH, M.A.

135D, HARISH MUKHERJEE

Road,
CALCUTTA.

22nd March, 1939.

THE TREATMENT OF LOBAR PNEUMONIA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—With reference to your Editorial in the *Indian Medical Gazette* of October last, a special perforated nasal catheter is now available; it is made in Germany and bears the words 'Rosch Anskochbar' B6. Ordinary rubber catheters when perforated may inconvenience patients, as the punctured holes at times are not smooth, while the perforations, which are all round the tip of the catheter mentioned by me, are very smooth and have never inconvenienced my patients.

Yours, etc.,

CAPTAIN N. D. BANERJI, A.I.R.O.,
M.B., B.S.

RESIDENT MEDICAL OFFICER,
J. K. GROUP OF MILLS,
CAWNPORE,
24th March, 1939.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL E. COTTER, Deputy Public Health Commissioner with the Government of India, is appointed to officiate as Public Health Commissioner with the Government of India, with effect from the 24th March, 1939, *vice* Colonel Sir Alexander Russell, C.B.E., K.H.S., granted leave.

On the termination of special duty as Secretary to the All-India Inspectors-General of Prisons Conference, Lieutenant-Colonel P. D. Chopra assumed charge of the office of Superintendent, New Central Jail, Multan, on the afternoon of the 11th February, 1939.

The Governor is pleased to appoint Lieutenant-Colonel T. C. Boyd, Principal, Medical College, and Superintendent of the Medical College Hospitals, Calcutta, to act as Surgeon-General with the Government of Bengal, *vice* Major-General P. S. Mills, C.I.E., granted leave, or until further orders.

Lieutenant-Colonel J. C. De, Civil Surgeon, 24-Parganas, on relief, is appointed to act as Principal,

Medical College, and Superintendent of the Medical College Hospitals, Calcutta, *vice* Lieutenant-Colonel T. C. Boyd, or until further orders.

Lieutenant-Colonel S. Nag, on the expiry of his leave, is appointed to be Civil Surgeon, 24-Parganas, temporarily, *vice* Lieutenant-Colonel J. C. De, or until further orders.

Lieutenant-Colonel V. Mahadevan, Professor of Operative Surgery, Medical College, and Surgeon, Government General Hospital, Madras, to act as Professor of Surgery, Medical College, Surgeon and Superintendent, Government General Hospital, Madras, with effect from the date of taking charge, *vice* Lieutenant-Colonel M. M. Cruickshank proceeding on leave.

Lieutenant-Colonel T. S. Shastri, District Medical Officer, Tinnevely, Superintendent, Government Headquarters Hospital, and Medical Officer, Borstal School, Palamcottah, to act as District Medical Officer, Kistna, and Superintendent, Government Headquarters Hospital, Masulipatam, with effect from the 1st April, 1939, *vice* Lieutenant-Colonel K. V. Ramana Rao transferred.

Lieutenant-Colonel K. V. Ramana Rao, District Medical Officer, Kistna, and Superintendent, Government Headquarters Hospital, Masulipatam, to act as District Medical Officer, Tinnevely, Superintendent, Government Headquarters Hospital, and Medical Officer, Borstal School, Palamcottah, with effect from the date of taking charge, *vice* Lieutenant-Colonel T. S. Shastri transferred.

Major J. F. Shepherd, District Medical Officer, North Arcot, and Superintendent, Government District Headquarters Hospital, Vellore, to act as Senior Specialist in Surgery, Surgeon, Government General Hospital, and Professor of Operative Surgery, Medical College, Madras, with effect from the date of taking charge, *vice* Lieutenant-Colonel M. M. Cruickshank and Lieutenant-Colonel V. Mahadevan.

The services of Major W. F. Cooper are replaced at the disposal of the Defence Department, with effect from the afternoon of the 30th December, 1938.

Major E. A. O'Connor, an Officiating Agency Surgeon, on return from leave, is posted as Civil Surgeon, Quetta-Sibi, with effect from the afternoon of the 8th March, 1939.

Major M. L. Ahuja, an Officer of the Medical Research Department, is appointed Officiating Assistant Director, Central Research Institute, Kasauli, with effect from the 10th March, 1939.

Major C. K. Lakshmanan, Port Health Officer, Calcutta, is appointed to officiate as Deputy Public Health Commissioner with the Government of India, with effect from the 24th March, 1939.

Major S. Annaswami made over charge of the Midnapore Central Jail to Captain J. W. D. Goodall in the afternoon of the 19th March, 1939.

Major G. B. W. Fisher, Civil Surgeon, Bakarganj, on relief, is appointed to be Civil Surgeon, Jalpaiguri.

Captain J. Edis Myers, on return from leave, to act as District Medical Officer and Superintendent, Government Headquarters Hospital, Bellary, with effect from the date of taking charge.

Subject to the approval of the Secretary of State for India to the transfer to the Civil Branch of the Indian Medical Service of Captain J. H. Gorman, that officer is appointed as a leave reserve officer under the Central Government and is attached, until further orders, to the office of the Port Health Officer, Bombay, with effect from the 6th February, 1939.

Captain J. W. D. Goodall, Civil Surgeon, Midnapore, is appointed to act as Superintendent, Midnapore Central Jail, during the absence, on leave, of Major S. Annaswami, in addition to his own duties.

Captain F. W. Allinson, Civil Surgeon, Darjeeling, on relief by Major J. C. Drummond, was posted to the Presidency General Hospital as First Resident Medical Officer.

Captain W. M. Niblock, Second Resident Medical Officer, Presidency General Hospital, is appointed to act as First Resident Medical Officer of that institution, during the absence, on leave, of Captain Allinson

His Excellency the Governor of Bengal is pleased to appoint Captain P. I. Franks to be Surgeon on His Excellency's personal staff, with effect from the 24th February, 1939.

The following appointments are made:—
(Short Service Commission)

To be Lieutenants

Dated 12th January, 1939

Inderjit Singh.
Dipak Bhatia.
Nowshir Dinshaw Piroshaw Kurani.

Dated 1st February, 1939

Nowshir Jungalwalla.
Dharam Dev Verma.

The undermentioned appointment is made:—

To be Lieutenant (on probation)

1st January, 1939

Oliver Turquand Mansfield (secd.). (In substitution of the previous notification.)

LEAVE

The Governor is pleased to grant leave for 6 months to Major-General P. S. Mills, C.I.E., Surgeon-General with the Government of Bengal, with effect from the date on which he is relieved.

Colonel Sir Alexander Russell, C.M.E., K.H.S., Public Health Commissioner with the Government of India, is granted the following leave:—

- (i) Leave on average pay for 3 months and 22 days from the 24th March, 1939, to 21st April, 1939, and from the 18th May to 9th August, 1939, and
- (ii) Leave on half-average pay for 20 days from the 10th August to 29th August, 1939.

Lieutenant-Colonel E. W. O'G. Kirwan, C.I.E., Professor of Ophthalmic Surgery, Medical College, Calcutta, is granted leave for 6 months, with effect from 24th March, 1939, or from any subsequent date on which he was relieved.

Major E. G. Montgomery, Civil Surgeon, Dacca, is granted leave for 15 months, with effect from the 21st October, 1938.

Previous notification is hereby cancelled.

Major C. V. Falvey, Civil Surgeon, Bareilly, proceeded on 1 year's medical leave from 27th January, 1939, afternoon.

Major S. Annaswami, Superintendent, Midnapore Central Jail, is allowed leave on average pay for 3 months from the 15th March, 1939, or on any subsequent date on which he avails himself of it.

Major V. Aitchison, Civil Surgeon, Cawnpore, proceeded on 27 months and 22 days' combined leave pre-retirement, with effect from 1st March, 1939.

Captain F. W. Allinson, First Resident Medical Officer, Presidency General Hospital, is granted combined leave *ex-India* for 1 year, with effect from the 1st March, 1939, or any subsequent date on which he avails himself of the leave.

Captain B. A. Porritt, Acting District Medical Officer, Tanjore, is granted leave on average pay for 1 month and 11 days and military furlough for 19 days in continuation with effect from 6th May, 1939, or date of relief.

Captain F. H. A. L. Davidson, Civil Surgeon, Jalpaiguri, is granted leave for 1 year, with effect from the date on which he was relieved.

RETIREMENTS

Lieutenant-Colonel C. M. Plumtre is permitted to retire from Government service, with effect from 27th March, 1939, instead of from 27th December, 1939.

Lieutenant-Colonel B. Gale retires, 31st January, 1939.

Notes

ARMY AND NAVY STORES, LIMITED

THE Society has now at its London address a die of the badge of the 'Indian Medical Service', and a supply of the correct coloured ribbon available for the production of private Christmas cards; it is thought that this may be useful to officers of the Service who are on leave in England and require such cards.

MARMITE IN TROPICAL MEDICINE

NUTRITIONAL diseases are particularly common in tropical and sub-tropical countries, where the diets of the people are so often inadequate, and the prominent part played by deficiency of vitamin B₁ and the B₂ complex is attracting the notice of research workers and of government authorities. The special applicability of marmite, whether used as a medicine or as a food, in India and other tropical countries depends not only on its proved medicinal properties, but also on the fact that it is purely vegetable in origin and may therefore be taken freely by all those who, for religious or other reasons, insist upon a strictly vegetarian diet. Another point of practical importance is that it is economical in use and is not affected by climatic conditions.

Marmite is prescribed prophylactically and therapeutically in many countries including India, Burma, Malaya, China, Java, Egypt and Africa, its specific use in tropical medicine being to combat beri-beri, pellagra and tropical macrocytic anaemia.

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Communications for the Publishers relating to Subscriptions and Advertisements should be addressed to THE PUBLISHERS, *The Indian Medical Gazette*, P. O. Box No. 54, Calcutta.

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Original Articles

PRONTOSIL IN INDIAN STRAINS OF MALARIA

By R. N. CHOPRA, C.I.E., M.A., M.D., Sc.D. (Cantab.),
F.R.C.P. (Lond.)

BREVET-COLONEL, I.M.S.

Honorary Physician to the King

B. M. DAS GUPTA

B. SEN, B.Sc., M.B.

and

R. T. M. HAYTER, M.B.E.

(School of Tropical Medicine, Calcutta)

THE discovery of antimalarial properties in plasmochin and acridine derivatives such as atabrin is undoubtedly a great advance in the therapy of malaria. The untoward symptoms which are occasionally observed, their inability to prevent relapses in a certain percentage of cases and their not having a true prophylactic action, inasmuch as they have no action on the sporozoites injected by the mosquitoes, have however necessitated a vigorous search for drugs which may be free from these disadvantages. A large number of synthetic compounds have therefore been tried in malaria, but so far plasmochin and atabrin have held the field. For the last few years some of the compounds prepared from azo-dyes have been the subject of intensive study on the part of chemists, experimental pathologists and clinicians. Sulphanilamide is the name adopted by the Council of Pharmacy and Chemistry of the American Medical Association as a convenient abbreviation for p-amino-benzene sulphonamide, which has been shown to be the active portion of the molecule of prontosil, a drug which was first introduced by Damagk in 1935. A number of new compounds have since been produced whose activity depends on the presence of this molecule, and which are being extensively used by the medical profession in various infective conditions with remarkable success. These compounds have also been tried in the treatment of malaria and the views which have been expressed with regard to their efficacy in this disease are divergent. For instance, Díaz de León (1937), who was the first to carry out trials in malaria, treated 15 cases with apparently good results. The drug was administered by the mouth excepting in a severe case where he had recourse to an injection of 10 c.cm. of a 5 per cent solution, in addition to the usual administration by the mouth. Hill and Goodwin (1937) in the same year treated 100 cases of malaria with intramuscular injections of prontosil every twelve hours and found that 4 injections sufficed to produce satisfactory results. Read and Pino (1938), however, did not obtain encouraging results. They treated 3 cases of malaria with

the initial doses of 6 tablets (1.8 gm.) in 24 hours; afterwards the dosage was reduced to 3 tablets a day. Patients showing gastric symptoms were given intramuscular injections. These workers observed that sulphonamide has anti-malarial action of a mild order inasmuch as it has neither a sufficiently definite action on the cycle of schizogony nor has it remarkable properties as a gametocide. Pakenham-Walsh and Rennie (1938) treated a case of induced malaria with prontosil by giving 3 gm. of the drug daily for 3 days. The temperature came down and the parasites disappeared, but a week later, the fever relapsed and the parasite counts were nearly as high as in the original attack.

Das Gupta and Chopra (1938) tested the efficacy of prontosil in monkey malaria. They found that in doses of 0.5 to 1 c.cm., given intramuscularly, the drug failed altogether to check the multiplication of *P. knowlesi* in the rhesus monkey. The disproportionately heavy doses of 3 c.cm., however, proved effective. Trials were then carried out in the Carmichael Hospital for Tropical Diseases on a series of cases of human malaria with a view to seeing how effective the drug was in Indian strains of malaria if administered in such therapeutic doses as are effective in streptococcal infections. In the present paper the results of these trials have been recorded.

The patients were all admitted to the hospital and, with the exception of those showing urgent symptoms, the antimalarial treatment was withheld for a few days in order to select only those cases which did not show any tendency to spontaneous recovery. Approximate estimations of the number of parasites were daily made during this period and the treatment was started when the parasite counts were fairly uniform for two or three days. Daily examinations of the blood for malaria parasites were carried out during the course of treatment and also for a few days after the treatment was completed. The effects of the drug were carefully studied on (i) temperature, (ii) the sexual and the asexual forms of the parasites and (iii) the time taken for the disappearance of the parasites from the peripheral blood. Any untoward effects produced were recorded. Whenever possible, the patients were kept under observation for a fortnight or so after the treatment was completed and the cultural examinations of blood were also carried out in a number of cases to determine if the infection had been eradicated.

In the present series oral administration was the usual procedure but a perusal of the table will show that injections were also given in three cases. We first started with one tablet (0.5 gm.) three times a day for five days and later increased the dose to 2 tablets four times a day. In the one quartan case in this series the drug was continued for seven days. The injections were given intramuscularly in the gluteal region,

TABLE

Num-ber	Race, Sex and Age	FINDINGS OF PARASITES BEFORE TREATMENT			FINDINGS OF PARASITES DURING AND AFTER TREATMENT								Duration of fever in days after beginning treatment	REMARKS
		Species	As.	Sex.	2nd day		3rd day		4th day		5th day			
					As.	Sex.	As.	Sex.	As.	Sex.	As.	Sex.		
1	M., M., 20	B. T.	(1,000 per 500 W. B. C's).	0	Sc. (200 per 500 W. B. C's).	0	Sc.	0	V. Sc.	0	0	0	Five injections of 5 c.c. each of 5 per cent sol. on consecutive days. H. W. +, C. D. +.	
		B. T.	(900 per 500 W. B. C's).	0	(150 per 500 W. B. C's).	0	Sc.	0	Sc.	0	Sc.	0	Parasites reappeared after three days. Treated with prontosil (orally) 2 tabs. (0.5 gm. each) three times a day for 5 days. Although apyrexial the parasites persisted. Finally treated with atabrin.	
2	M., I. Ch., 11	B. T. M. T.	V. Sc.	0	Sc.	Sc.	Sc.	Sc.	V. Sc.	0	Sc.	0	Prontosil 3 c.c. i.m. for three days followed by one tab., t.i.d.s., for 5 days orally. Crescents treated with cilional. Relapsed two weeks after treatment. Finally cured with atabrin.	
3	H., M., 28	M. T.	(4 or 5 per field).	0	(2 or 3 per field).	0	(1 per field).	0	Sc.	0	Sc.	0	Two tabs. four times a day for 5 days. Rings persisted for 1 day after the treatment was started. Crescents not affected; destroyed with cilional. Kept in hospital for 1 month, no relapse. H. W. +.	
4	H., M., 22	M. T.	Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	0	Sc.	Sc.	Two tabs. four times a day for 5 days. Crescents destroyed with cilional. Observed in the hospital for 3 weeks. No relapse. C. D. +.	
5	H., M., 22	M. T.	(Thick film)	Sc.	0	Sc.	0	Sc.	0	Sc.	0	Sc.	Two tabs. four times a day for 5 days. Crescents persisted; observed in the hospital for 3 weeks. No relapse.	
6	H., M., 16	M. T.	V. Sc.	Sc.	V. Sc.	Sc.	(Thick film).	Sc.	0	Sc.	0	Sc.	Two tabs. four times a day for 5 days. Crescents persisted; observed in the hospital for 3 weeks. No relapse.	
7	M., M., 32	M. T.	+	0	Sc.	0	V. Sc.	0	0	0	0	0	Two tabs. four times a day for 5 days; observed for 8 days no relapse.	
8	E., M., 41	M. T.	Sc.	Sc.	Sc.	(Thick film).	(Thick film).	(Thick film).	0	V. Sc.	0	Sc.	Two tabs. four times a day for 5 days. Crescents persisted. Relapsed after 20 days. Finally treated with atabrin.	
9	M., M., 9	M. T.	Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	0	Sc.	0	Sc.	One tab. three times a day for 5 days. Apyrexial when treatment was started. Crescents persisted. Observed for 20 days; no relapse.	

the dose being 5 c.cm. of a 5 per cent solution for five consecutive days.

The table shows that prontosil does cause disappearance of the parasites from the peripheral blood; in cases of infection with *P. falciparum* the asexual forms were destroyed within 2 to 6 days but the sexual forms remained unaffected (cases 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 17 and 18). In infection with *P. vivax* both the asexual and sexual forms disappear from the peripheral blood within 2 to 5 days (cases 1, 2, 12, 16, 17 and 19). Unfortunately "only one case of pure quartan infection was admitted during the period of investigation and the effect of prontosil on both the asexual and the sexual forms of this species was found to be much less marked than on the other two infections, the parasites persisting for a comparatively longer period. It is also evident from the table that the patients who were given smaller doses of the drug (0.5 gm. three times a day for five days) were relieved of the symptoms and the blood was negative for malaria parasites, but the patients relapsed during their stay in the hospital. No relapse, however, occurred in those patients who received a higher dose (one gm. four times a day for five days), with the exception of one case who gave the history of long duration. In the present series, prontosil, administered by injection, did not prove to be as effective as when given by the mouth.

The untoward effects which were observed in a certain number of cases during the course of administration of prontosil were of mild character, and beyond slight epigastric distress and flatulence no toxic effects were recorded. One of the patients showed great sensitiveness to the drug and it had to be stopped.

Summary and conclusions

(1) Prontosil in ordinary therapeutic doses (3 to 4 gm. daily for five days) has an undoubted action in causing disappearance of malarial parasites from the peripheral blood and in controlling symptoms of the disease.

(2) It destroys both the asexual and sexual forms of *P. vivax* and *P. malariae* and only the asexual forms of *P. falciparum*. It has no action on the crescents. Its action on *P. malariae* appears to be comparatively slower and less potent.

(3) In smaller doses (1.5 to 2.0 gm. daily for five days) the symptoms of the disease abated and the parasites disappeared from the peripheral blood but recrudescence of the disease occurred within a fortnight.

(4) Prontosil undoubtedly possesses mild antimalarial properties in infections with Indian strains of malaria and is worthy of trial when other antimalarial drugs are not available or are contraindicated.

The series is very small and the conclusions are only tentative.

(Continued at foot of next column)

THE CALCIUM AND PHOSPHORUS CONTENT OF STUDENTS' DIETARIES

By K. C. SAHA

K. L. ROY

and

B. C. GUHA

(From the University College of Science, Calcutta)

EARLIER work (Pal and Guha, 1937) had indicated the probability that the diet consumed by middle-class people in Calcutta was appreciably deficient in calcium. We sought to obtain further information on this question by investigating the cooked diets consumed by general middle-class students in some of the hostels of Calcutta. Eight hostels were chosen and the cooked diets, consisting of the chief day and evening meals, were analysed to find the average consumption of calcium and phosphorus per head per day. As the bulk of the daily diet was composed of rice, it was considered desirable to estimate the phytin phosphorus of the diet, for phytin phosphorus is not available for nutrition and should be subtracted from the total phosphorus. An aliquot of the total mixed diet, meant for one average individual, was analysed as was done in previous work (Guha, 1934). The figures for calcium (in terms of CaO) and phosphorus are given in table I. The values for phytin phosphorus and total phosphorus obtained on those days, on which both of them were estimated in the same diet, are given in table II. A statistical note on the significance of the results by Mr. K. C. Basak is also given.

Thus the mean values for calcium and phosphorus content per head per day, considering all the hostels and all the days, are 0.636 and 1.01 gm. respectively.

Statistical note

The following two analyses of variance do not show any significant difference in the average calcium oxide and phosphorus contents of the diets of the different hostels.

It will be noticed that in both the cases the mean square within hostels is greater than that between hostels. This shows that the greater part of the variation is due to the daily variation in the amount of CaO and phosphorus in the diet of each hostel.

(Continued from previous column)

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TABLE I

The figures for CaO and P are given in grammes per head per day

Day	HOSTEL 1		HOSTEL 2		HOSTEL 3		HOSTEL 4		HOSTEL 5		HOSTEL 6		HOSTEL 7		HOSTEL 8	
	CaO	P	CaO	P	CaO	P	CaO	P	CaO	P	CaO	P	CaO	P	CaO	P
1	0.90	1.18	1.23	1.09	1.17	1.12	0.96	1.08	0.82	1.15	1.08	1.18	0.80	0.95	0.85	1.04
2	0.83	1.01	0.93	0.91	0.86	1.25	0.89	1.08	0.81	0.78	0.75	1.04	0.75	0.98	0.98	1.20
3	0.96	0.84	0.89	0.90	0.96	0.66	0.84	1.20	0.88	1.01	1.01	1.34	0.72	0.98	0.80	1.17
4	0.80	0.98	0.87	1.09	0.98	1.20	1.07	0.97	1.03	0.89	0.74	0.77	0.79	0.88	0.97	0.78
5	0.82	1.22	0.90	0.90	0.80	1.0	0.82	1.16	1.06	0.87	0.98	0.90	0.62	1.05	1.09	1.02
6	0.86	1.13	1.01	1.12	0.90	1.10	1.03	1.04	0.75	0.81	0.97	0.79	0.75	1.04	1.13	0.84
7	0.73	0.90	0.98	0.93	0.90	1.05	1.11	0.77	0.81	1.40	0.81	1.06	1.06	1.09	0.81	1.06
8	1.08	0.98	0.77	0.95	0.87	0.81	0.85	1.13	1.02	1.03	0.83	1.15	0.84	0.94	0.92	0.87
Average	0.87	1.03	0.95	0.99	0.93	1.01	0.95	1.05	0.885	0.99	0.81	1.03	0.80	0.99	0.94	0.998

TABLE II

Hostel number	Total P (g.)	Phytin P (g.)	Available P (g.) (Total P—Phytin P)
1	1.03	0.28	0.75
2	0.99	0.35	0.64
3	1.01	0.47	0.54
4	1.05	0.28	0.77
5	0.99	0.45	0.54
6	1.03	0.36	0.67
7	0.99	0.44	0.55
8	0.998	0.36	0.64
Average	1.01	0.37	0.64

Analysis of variance for CaO

Source of variance	Degrees of freedom	Sum of square	Mean square
Between hostels	7	0.1607	0.0230
Within "	56	1.8292	0.0327
TOTAL ..	63	1.9899	..

Analysis of variance for P

Source of variation	Degrees of freedom	Sum of square	Mean square
Between hostels	7	0.0333	0.0048
Within "	56	1.3482	0.0241
TOTAL ..	63	1.3815	..

Discussion and summary

It is clear from the statistical analysis of the results that the variations in the consumption from hostel to hostel are not great. The results can, therefore, be reasonably accepted as indicating the average consumption of calcium and phosphorus by the student population of Calcutta living in hostels. The consumption of Ca (0.636 g. per head per day on an average) appears to be appreciably lower than the optimum intake, which is usually accepted to be of the order of 1 g. per day*. Thus the diet seems to be somewhat deficient in calcium just as it is in ionizable iron (Roy, Pal and Guha, 1939). The consumption of P (1.01 g. per head per day on an average) seems, however, to be almost adequate, as 1 to 1.3 g. of P intake is usually considered sufficient, but, as the figures for the phytin content of the diets show, probably 30 to 40 per cent of the total phosphorus is not available for nutrition. Supplementing the usual diet in the students' hostels with the requisite quantity of milk would apparently satisfy the requirement of extra calcium and phosphorus in an assimilable form.

We wish to acknowledge our gratitude to the Calcutta University Students' Welfare Committee for grants and to the Secretary of the Committee, Dr. A. N. Chatterjee, for much help in carrying out this work.

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* Authorities place the maintenance requirement of calcium for health at between 0.45 and 0.55 gm. daily. Allowing for probable retention the accepted value is placed at 0.765 gm. daily, therefore, the calcium deficiency claimed by these authors is not as obvious as they indicate.—EDITOR, *I. M. G.*

EVOLUTION OF GOLD THERAPY IN PHTHISIS

PART II

By S. K. DAS, M.B. (Cal.)

Visiting Physician, Islamia Hospital, Calcutta

THE choice of a case is the keystone to success in gold therapy and the one point that should always be taken into consideration is that gold stimulates the cells of the reticulo-endothelial system lining the capillaries and blood vessels, and therefore if the lesion is not well supplied with them, that is, is a productive lesion, it cannot have much, if any, effect.

An ideal patient is one with sufficient resistance, preferably afebrile or slightly febrile, and with sound kidneys, liver and heart. There should not be too much of a reaction but if reaction occurs at all, he must be able to withstand it. Menstrual periods in females must be respected and in pregnancy that has not been terminated gold must be given with extra care.

Precautions.—An expert opinion as to the suitability of gold therapy must be taken in every case. Proper investigation must be made into the patient's general condition. The patient must not be too toxic and there ought to be fair resistance present.

In cases that show a highly toxic condition the patient must be put to bed, and glucose and alkalies by mouth as well as calcium therapy may be instituted to avert toxic symptoms.

The urine is examined for sugar and albumin, casts, red blood cells, etc. Severe diabetes as well as gross renal defects are contra-indications of gold therapy.

If the liver is suspected not to be functioning well, a liver function test (levulose-tolerance test) may be done and small intramuscular dosage must be resorted to.

In blood diseases, the history will be found useful and in suspected hæmophilia or purpura the bleeding and coagulation time may be determined, and a differential count of leucocytes will be found useful.

Sensitiveness or idiosyncrasy to gold therapy might be determined by a small initial test dosage. There are advocates of the use of sodium or calcium thiosulphate, as well as ascorbic acid but I have never found the need of them in my experience. Glucose is always helpful.

The heart also must be examined, and although it is a fact that a simultaneous affection of the heart suggests grave prognosis yet small doses of intramuscular Myocrisin in oil may be used in such cases.

Liver extract by mouth has been recommended by some as a preventive of reactions.

Careful watch for unfavourable reactions must be always kept and any such reactions must be speedily treated, and gold therapy must be temporarily or permanently suspended.

The lesion

Unilateral cases.—In early caseous types or in semi-productive infiltrations I have seen remarkable results with intravenous gold therapy wherever it was applicable, failing this the intramuscular route is also quite good.

In chronic productive types of infiltration, gold is of doubtful value, but wherever acute exacerbation or recrudescence of the disease has occurred, or the disease tends to increase by caseous process, gold may be applied to check the progress of the disease.

It must be borne in mind that extensive unilateral infiltrations should never be treated with gold alone, but should be combined with surgical measures.

Bilateral cases.—In early bilateral infiltrations gold therapy is the method of choice especially if the lesion be caseous or fibro-caseous in nature. The result should be checked from time to time by x-ray examination and if the progress of the disease process goes unabated the more active side should be surgically dealt with while gold must be continued for the other lung.

If during the course of surgical treatment for one lung with apparent success, the other lung is affected, gold treatment should be at once instituted, if not already adopted.

In moderately extensive bilateral lesions gold may be given a trial along with sanatorium measures, if the pulse and temperature can be controlled by ordinary measures and absolute rest. In a similar case a chance might be taken by surgically dealing with the more active lung, the operation of choice being phrenic evulsion as all other forms are contra-indicated.

The preparations.—The preparations of gold to be used have been fully discussed elsewhere by the writer (Das, 1936 and 1937) I have chiefly used Crisalbine for intravenous and Myocrisin in oil for intramuscular therapy and these preparations I consider the best.

Contra-indications:

1. Absolute

- (a) Gross renal diseases.
- (b) Hepatic diseases.
- (c) Diabetes.
- (d) Grossly damaged decompensated heart.
- (e) Hæmorrhagic diseases.
- (f) Devalitized patient.
- (g) Highly toxic conditions including hyperpyrexia.
- (h) Extensive bilateral lesions.
- (i) Idiosyncrasy.
- (j) After reactionary manifestations.
- (k) Toxæmia of pregnancy.

2. Relative

- (a) Menstrual periods.
- (b) During or after hæmoptysis.
- (c) Hypertension.
- (d) Pregnancy with disorders and abnormalities.
- (e) Highly productive lesions.
- (f) Patients with high temperature and pulse rate.
- (g) Symptoms of intolerance: here some other preparations might be of use.
- (h) Slight degree of hepatic or renal dysfunction.

Mode of administration and dosage

It is important to get as much gold into the system as quickly as is compatible with safety. Women and small weak men should get smaller doses for a longer period.

Crisalbinc.—For a patient with average health, weighing from 7 to 9 stone, a total of about 3 grammes is perhaps the most suitable dose. It has to be given by very slow intravenous injection noting the condition of the patient all the time. It is always desirable that we should have adrenaline chloride solution and a separate small hypodermic syringe ready at hand. A 4.5 to 5 per cent solution is isotonic with blood and 2 c.cm. of a solvent per each 0.10 gm. of Crisalbinc will make an approximately isotonic solution with blood.

The solvent.—Freshly boiled double-distilled water has been recommended by some while others use sterile double-distilled water.

Sodium thiosulphate solution has been recommended with the idea that toxic effects, if any, will be lessened, and as a protection against accidental subcutaneous infiltration. Calcium thiosulphate solution has also been used by some, apparently with the idea of combining calcium with gold. I have seen some using 10 per cent solution of calcium gluconate, evidently with the same idea, and I have watched the cases with interest but failed to find any added advantage in this method.

Crisalbinc is compatible with all the above solvents. I have found 12½ per cent glucose solution (Merck) to be the best. With this I have never seen any toxic by-effects. It saves the kidneys, heart and liver from damage.

The patient

The injection is best given in the morning before the patient gets out of bed. He is made to drink a good quantity of glucose (4 teaspoonfuls to a tumbler) or sugar candy (misri) water about half an hour before the injection. The early morning urine is examined for albumin (a previous sample having been examined for albumin, casts, and red corpuscles) and the urine after the injection is also examined for albumin. The patient is never allowed to have a hearty meal or take exercise one hour before or after an injection.

Though some people recommended an interval of 4 to 5 days for the first few small doses I never like to undertake such a risk and nothing less than a week's interval should be allowed between each injection. The patients must be kept as bed cases at the start of the treatment.

Cardiac tonics have been recommended as a routine process by some authors before each injection.

A chart giving the following information is kept for watching the progress of the disease:—

Temperature, pulse and respiration—morning and evening.

Weight—once a week.

Urine—for albumin before and after each injection.

Blood—for sedimentation rate and wherever possible Schilling count, once a month.

Reactions—if any.

Cough—any improvement or not.

Sputum—total amount in 24 hours and acid-fast bacilli.

X-ray—once in three months in an improving case and oftener if symptoms persist.

General condition—any improvement noticed or not.

Auscultation—any diminution or disappearance of moist râles, noticed or not.

Unless improvement is noticed in a majority of these points the result must be checked by x-ray examination and a suitable treatment adopted.

Technique

The most suitable dose of gold sodium thiosulphate (notably of Crisalbinc) is given below.

The patient is placed in a good light and the assistant is asked to hold the arm with the most prominent vein with one hand above the elbow firmly grasping it with the object of making the vein prominent and the other below the elbow with the object of supporting the forearm.

A platinum needle has been recommended but ordinary needles have been found to be quite good. A 10 c.cm. syringe has to be boiled (and not sterilized with alcohol) for at least fifteen minutes. After properly washing the hands with soap and with alcohol, the syringe is rinsed thoroughly with the needle attached with a 5 c.cm. ampoule of double-distilled water. The desired quantity of 12½ per cent glucose solution is then drawn into the syringe. An ampoule containing the desired dose of Crisalbinc is taken and a portion of the glucose solution from the syringe is expelled into the ampoule; solution is made by gently rotating the ampoule between the palms of the hands and the solution is then drawn back into the same syringe and mixed with the remaining glucose solution in the syringe. It is then injected by the slow intravenous method, the whole process of injection covering at least 15 to 20 minutes. In the meantime the condition of the patient is carefully watched. Change in colour or appearance

The dose

Time	Crisalbinc	In 12½ per cent glucose Merck's solution
1st week ..	0.05 gm.	3 c.c.
2nd " ..	0.1 "	3 "
3rd " ..	0.1 "	3 "
4th " ..	0.15 "	4 "
5th " ..	0.2 "	5 "
6th " ..	0.2 "	5 "
7th " ..	0.25 "	6 "
8th " ..	0.25 "	6 "
9th " ..	0.35 "	8 "
10th " ..	0.35 "	8 "
11th " ..	0.4 "	10 "
12th " ..	0.4 "	10 "
13th " ..	0.5 "	10 "
TOTAL 13 weeks ..	3.30 gm.	

of the patient's face is an urgent warning to stop the injection at once and to inject $\frac{1}{2}$ c.cm. of 1 in 1,000 adrenaline chloride hypodermically.

Subject to all the precautions mentioned above specially of urine examination the rest of the glucose solution from a 25 c.cm. ampoule may be given to the patient to drink immediately before the injection.

After this the patient is asked to undergo sanatorium régime for a period of 3 months and the condition is watched all the time, at the end of this period another course of gold may be necessary for which I prefer Myocrisin in oil.

Myocrisin in oil.—Precautions similar to those observed in intravenous medication have to be adopted.

Before the injection the ampoule may be placed in warm water for a short while or shaken violently in order to get a homogeneous solution and the preparation is ready for injection with a thick needle.

The dose

1st week	..	0.01 gm.
2nd "	..	0.02 "
3rd "	..	0.05 "
4th "	..	0.1 "
5th "	..	0.2 "
6th "	..	0.3 "
7th "	..	0.5 "
8th "	..	0.5 "
9th "	..	0.5 "
10th "	..	0.5 "
11th "	..	0.5 "
TOTAL 11 weeks		3 18 "

Good results.—The patient generally feels a sense of well-being and energy. The appearance becomes brighter and the weight increases. The patient gradually becomes afebrile and later on he is allowed to sit up, walk or take graduated exercise. The pulse and respiration rates come down to normal and the cardiac tolerance test, seen by the counting of pulse and respiration after measured exercise, speedily comes down to normal. The symptoms disappear gradually, and though cough persists longer than any others it also disappears in the long run. The sputum becomes less in quantity and gradually comes down to a negligible amount. The character of the sputum also changes from thick purulent to mucopurulent, then to mucoid and finally to watery. Tubercle bacilli, if present to start with, tend to disappear not because of any direct bactericidal effect, but because the lesion becomes more productive, the supply of nourishment to the bacilli *via* blood and lymph is cut off and they die. Positive sputum towards the end of the treatment with every symptom coming down to normal is not a serious matter, because if we conclude our treatment with sanatorium régime, positive sputum might help to bring about auto-inoculation (Paterson). The evidence of the lesion finally tends to disappear;

the moist râles disappear and finally only a deficient air entry or a slight harsh breathing may be found to be the only remnant of the physical signs.

Laboratory tests.—The Schilling count, if available, is valuable in prognosis. A very convenient method is to observe the erythrocyte sedimentation rate; this can be easily done by the patient's bedside once every month. Provided the external factors such as febrile reactions, catarrh, menstrual periods in females, etc., be carefully avoided, the comparative study of the sedimentation rate will give an indication of the progress of the disease. The reading finally comes down to normal figures (2—5). In an Arneeth count there is a shift to the right.

An increase in the eosinophil cells, lymphocytes and monocytes indicates improvement. According to some French authors large increase in eosinophil and neutrophil cells is a good sign. This is strongly contradicted by Schröder who goes so far as to suggest that it is an indication of gold poisoning and must be avoided.

The vital capacity test may also help but it is not possible in every case.

Radiological evidence of the improvement of the lesion is by far the best test of all and in an x-ray plate we may expect to find that the lesion to some extent disappears, leaving a fibrous tissue scar or the lesion becomes more concentrated and calcified. Some lesions tend to become so proliferative that some retraction of the trachea may be noticed or the mediastinum may be slightly drawn up, due to the traction of the fibrous tissue formed in the lesion.

Unfavourable reactions and their treatment

Toxic shock.—This occurs almost immediately with the injection and sometimes a little later. The patient becomes cyanosed, the body becomes cold and clammy, there is generalized tremor and the patient sometimes loses consciousness. There is profuse perspiration, nausea and vomiting. The pulse becomes feeble and rapid, the respiration hurried, the temperature subnormal and the blood pressure falls.

A careful physician would not allow complete collapse as he will withdraw the needle when there is the slightest indication of shock. The patient is quickly put under the fan and made to lie in bed and $\frac{1}{2}$ c.cm. of 1 in 1,000 adrenaline chloride is quickly injected hypodermically; this may be repeated if necessary. The body is covered with warm blankets and cold water may be sprinkled on the face, and smelling salts administered. Recovery is the rule in a few minutes to half an hour.

Fever.—As we have noted before, we should see that the patient becomes afebrile or mildly febrile before the institution of gold therapy. Febrile reaction may be of two types:—

(a) Sharp rise after the injection which passes off after a day or two. This should not

alarm us and it is no contra-indication to treatment. In some cases it may be advisable not to increase the dose on the next occasion or to make it more dilute and prolong the period of injection, but as a rule these precautions are unnecessary and we may proceed with the treatment.

(b) Low continued temperature for a long period. This is an alarming symptom. We must check our results with auscultation and with x-ray examination and the urine must be examined. It does not indicate, however, that we must stop the treatment but we must see if it is possible to give some surgical aid. If the reaction persists we may use the lower doses of Myocrisin in oil.


(c) Persistent hyperpyrexia is a serious reaction. Gold therapy is absolutely contra-indicated. Alkalies and glucose should be given.

Albuminuria (nephropathia aurea).—Early albuminuria is harmless. There may be a trace of albumin present but no casts or red corpuscles. This is generally due to an overdose and may be described as proteotoxic shock. The dose should be diminished and the treatment suspended for a time. Some people do not even advise a suspension of gold therapy, but it is better not to take a risk. Glucose water and lime or orange juice should be given in plenty and an alkaline mixture can be given. It may be necessary in some cases to give 25 c.cm. of 25 per cent Merck's glucose solution intravenously with insulin 10 units hypodermically daily for a few days when albuminuria should disappear.

Late albuminuria.—A very bold statement has been made by Wingfield: 'My experience, admittedly more limited than many others, is that albuminuria appears in every case and is usually accompanied by the appearance of renal and pus cells in the urine and that it is usually symptomless. If the patient is doing well and the nephritis is symptomless, I think it can be to a large extent disregarded'. We do not agree with this and we take albuminuria with casts and pus cells as a grave symptom. It is highly improbable that toxic nephritis will not cause any symptom and will not aggravate the disease. Nor has it been our experience that albuminuria appears in every case. We are fortunate that not a single case treated by gold under our care showed albumin and casts in the urine.

Gastro-intestinal disturbances.—Vomiting immediately after an intravenous injection is a very common feature. But sometimes nausea may persist for days and there may be actual vomiting. There may be loss of appetite, the digestion may be upset and there may be diarrhoea. Immediate vomiting is not of much importance as it will disappear with a liberal use of glucose and sips of ice. When symptoms of diarrhoea come on calcium will be

found of value. Ten per cent calcium gluconate, 5 c.cm. intravenously or intramuscularly every 2 or 3 days, 1 c.cm. of colloidal calcium with vitamin D intramuscularly every day, or calcium thiosulphate may be used. Ascorbic acid is also said to help. This condition must be distinguished from symptoms of abdominal infection and the patient must be particularly advised not to swallow sputum.

Dermatitis  (1) Exanthematous.
(2) Enanthematous.
(3) Nine-day erythema.

A very distressing generalized dermatitis may be found which may be of any type but is usually exfoliative. This is an absolute indication of suspending gold therapy forever. The patient must be kept in bed and sodium or calcium thiosulphate should be administered as well as calcium by mouth and hypodermically.

Small patchy areas may sometimes appear which may be a warning signal of an oncoming generalized dermatitis. Here also the same form of treatment will hold good, but before reinstating gold therapy one must be perfectly satisfied that the condition has thoroughly disappeared. The dose must be very small and preferably intramuscular.

In cases of very distressing symptoms local application of calamine lotion and a warm saline bath will be found very useful. Sedatives must be given and a brisk saline draught should be prescribed. Morphia may have to be used as a last resort.

Freund recommends a preparation called asthomolysin made up of adrenaline and pituitrin which he claims will quickly cure the eruptions and the irritation will almost immediately disappear.

Hyperidrosis.—Generalized hyperidrosis or bromidrosis may sometimes make their appearance. The former has been described as a grave symptom and a warning signal of a graver consequence by Heaf, who recommends complete suspension of gold therapy in such cases.

The patient must be put to bed under the fan and $\frac{1}{2}$ c.cm. of 1 in 1,000 adrenaline solution with atropine of 1/200 should be given hypodermically. A spray of cold water on the face and a dose of a stimulant will be of great help.

Joint pains sometimes make their appearance but this is only temporary and may be disregarded. They are relieved by local applications and rest.

Metallic taste in the mouth is a very distressing symptom; liberal glucose drinks may help.

Biotropism is exacerbation of latent foci; this is rare with gold. The commonest reactions are—nine-day erythema; transitory diarrhoea and colic; gold influenza; neuralgic pains; herpes zoster; various inflammatory reactions local or elsewhere including bronchitis and conjunctivitis.

In these cases gold should be suspended for the time being and ordinary treatment of fever

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H & O AGGLUTININS IN CHOLERA PATIENTS

By C. L. PASRICHA

MAJOR, I.M.S.

D. N. CHATTERJEE

and

B. M. PAUL

(From the Cholera Bacteriological Enquiry, Indian Research Fund Association, School of Tropical Medicine, Calcutta)

THE development of agglutinins for *V. cholerae* in cholera patients has been recorded by a number of workers. Greig (1914) examined the blood of 363 cholera patients and found that in a few cases cholera agglutinins had developed as early as the second day of the disease but this was exceptional. The specific agglutinins were well marked on the sixth day of the disease and the titre remained high from the sixth to seventeenth day. A drop occurred in the agglutination curve on the twentieth day. The titre varied from 1 in 40 to 1 in 1,000. Agglutinins were absent in the majority of the fatal cases of cholera. In cases in which both *V. cholerae* and inagglutinable vibrios were isolated, agglutinins were developed only against *V. cholerae* and not against the other vibrios. These findings have been corroborated by subsequent workers.

In view of the recent work on the antigenic structure of *V. cholerae* it was thought desirable to study the development of the 'H' and 'O' agglutinins in cholera patients. The blood from 175 cholera patients was examined. Agglutination test was put up in Dreyer's tube using a

(Continued from previous page)

with alkalies, neuralgia with aspirin and salicylates, abdominal pain, colic or diarrhoea with belladonna and calcium should be adopted. If the symptoms have been absent for 24 hours lower intramuscular doses may be adopted.

Jaundice is a grave symptom. Liberal use of glucose will cure the condition but gold therapy must be entirely suspended.

Minor symptoms but by no means negligible and which demand suspension of gold therapy altogether are sleeplessness or undue sleepiness, lassitude and a continued sinking lazy feeling.

I always support my cases undergoing gold therapy by sanatorium measures, artificial pneumothorax, phrenic evulsion, oleothorax, gelatinothorax, according to the special indications of individual cases. I have followed a few hospital cases of thoracoplasty supported by various forms of chrysotherapy and the results have been uniformly encouraging.

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formolized (0.2 per cent) suspension of a young agar culture as the H antigen and a boiled suspension in saline as the O antigen. Alcohol-treated vibrios or vibrios suspended in 0.5 per cent lithium chloride were not as satisfactory as the boiled suspension. Final readings were taken after 18 hours in a water bath at 55°C.

The results of the agglutination test and the bacteriological findings are given below in tabular form.

TABLE I

Cholera agglutinins (on specified days of the disease) in patients from whom V. cholerae was isolated. Other types of vibrios were not isolated from these cases

Day of disease, blood collected	Number of patients examined	Number of patients with cholera agglutinins	Agglutinins for <i>V. cholerae</i> (Inaba)	
			H	O
1	19	0	..	..
2	13	0	..	..
3	7	0	..	..
4	8	4	80 40 40 20	0 0 10 0
5	8	4	80 80 80 80	0 80 40 40
6	10	5	80 80 20 40 80	40 80 10 20 40
7	13	8	320 80 320 160 80 160 80 320	10 0 10 160 80 20 10 0
8	20	18	320 160 320 80 160 320 40 80 80 160 320 320 160 40 320 80 80 320	80 0 0 20 80 320 20 0 80 0 160 80 40 0 160 0 10 10

TABLE I—concl'd.

Day of disease, blood collected	Number of patients examined	Number of patients with cholera agglutinins	Agglutinins for <i>V. cholerae</i> (Inaba)	
			H	O
9	24	18	160	10
			160	0
			40	0
			160	40
			160	160
			40	20
			320	160
			160	0
			20	20
			40	0
			640	10
			40	20
			320	160
			320	80
			160	80
			40	20
			40	20
			80	20
10	23	17	320	80
			160	0
			320	160
			160	0
			320	80
			320	80
			80	10
			320	0
			320	160
			320	80
			320	160
			160	80
			80	40
			40	40
			320	40
			320	40
			40	0
11	9	8	20	0
			640	160
			320	320
			320	40
			20	0
			20	20
12-14	11	9	20	20
			20	20
			160	80
			640	80
			640	160
			640	80
			160	40
			80	20
			640	0
			640	40
			640	160

From tables I and II it will be seen that:—

1. Cholera agglutinins are not demonstrable during the first three days of the disease.

2. On the 4th day cholera agglutinins are found in half the number of patients examined.

From the 6th day onwards agglutinins are present in increasing numbers of patients.

3. The development of H agglutinins is earlier and to a higher titre than of O agglutinins.

TABLE II

Showing the number of cholera patients (bacteriologically proven, non-fatal) examined on different days of the disease and the number and percentage in whom cholera agglutinins (H & O) were found

Days of disease	Number of cases examined	Number showing cholera agglutinins	Percentage showing cholera agglutinins	
			H	O
1st	19	0	0	0
2nd	13	0	0	0
3rd	17	0	0	0
4th	8	4	50	12
5th	8	4	50	37
6th	10	5	50	50
7th	13	8	61	46
8th	20	18	90	55
9th	24	18	71	60
10th	23	17	74	57
11th	9	8	90	66
12th	11	9	81	73

4. There are certain bacteriologically proven non-fatal cholera patients, who do not show agglutinins for the standard cholera strain Inaba. This is more marked in cases of O agglutinins and is well seen in table III in which are recorded the results of examination of 61 patients in whom agglutination tests were put up with the Inaba strain and with the homologous strain. Only those cases in which agglutinins were present for the homologous strain are included in this table. Agglutinins for Inaba were absent in 11 (or 20 per cent) of this series.

In patients from whom Ogawa strains of *V. cholerae* were isolated the agglutinins are most marked for the homologous strains. The few anomalous results are explained by the fact that in a number of cholera patients both the Inaba and Ogawa types of *V. cholerae* were found.

In nine patients agglutinins (mainly H type) were found for the Inaba strain and no agglutinins for the case strains. These are shown in table IV. No satisfactory explanation can be advanced for these findings.

The development of agglutinins in patients in whom *V. cholerae* and inagglutinable vibrios were isolated is shown in table V. It will be seen that in bacteriologically proven cholera cases (table V) agglutinins for *V. cholerae* were found in the 7 patients examined on the 8th and 10th day of the disease. In one patient H agglutinins in a titre of 1 in 20 for the homologous inagglutinable strain were present on the first day of the disease and in another patient H agglutinins (1 in 80) were present on the 8th day of the disease. The first case can be disregarded and the second is of particular interest as the inagglutinable vibrio from the case

TABLE III

Showing the agglutinins (on different days of the disease) for *V. cholerae* (Inaba) and the homologous agglutinable strain

Day of disease	Case number	AGGLUTININS				Types of the homologous strain
		Inaba strain		Homologous strain		
		H	O	H	O	
5	1109	80	0	10	0	Inaba
	1118	80	80	40	80	"
	1151	0	0	20	0	"
7	785	0	0	40	20	Ogawa
	812	0	0	0	80	"
	820	160	20	80	20	"
8	430	320	80	80	80	Inaba
	727	80	20	160	20	Ogawa
	728	160	80	80	10	Inaba
	756	320	320	320	10	"
	776	0	0	640	40	Ogawa
	777	40	20	40	20	"
	779	80	0	80	20	"
	782	80	80	20	0	Inaba
	801	160	0	320	20	"
	832	320	80	320	80	"
	838	160	40	40	20	"
	862	80	0	40	0	Ogawa
9	541	160	0	20	10	Ogawa
	762	160	40	160	0	"
	763	160	160	0	80	"
	761	40	20	40	20	Inaba
	769	320	160	160	40	"
	770	0	0	20	0	"
	772	0	0	40	20	"
	804	160	0	80	20	Ogawa
	806	20	10	10	0	Inaba
	808	40	0	80	10	"
	836	40	20	20	40	"
	849	0	0	20	10	Ogawa
	852	320	80	80	40	"
	1165	40	20	40	20	Inaba
	1171	0	0	640	320	Ogawa
	1191	80	20	80	80	Inaba
10	536	320	80	320	0	} Not examined
	542	320	160	320	0	
	564	160	0	320	0	
	651	320	80	80	80	
	652	320	80	40	0	
	731	320	160	160	40	Inaba
	751	320	80	320	0	"
	752	320	160	320	160	"
	755	0	0	20	0	"
	795	160	80	20	80	"
	822	0	0	80	80	Ogawa
	828	80	40	80	20	Inaba
	845	40	40	40	20	Ogawa
	933	40	0	40	0	Inaba
11	743	320	320	320	0	Ogawa
	878	20	0	80	0	Inaba
	896	20	20	20	20	"
	1178	0	0	20	0	"
12, 13 and 14	697	640	80	80	0	Inaba
	712	640	160	160	20	"
	708	640	80	320	0	"
	887	160	40	160	20	"
	705	640	40	320	0	"
	860	640	160	640	40	Ogawa

TABLE IV

Showing 9 bacteriologically proven cholera patients in whom agglutinins were found for the Inaba strain of *V. cholerae* and none for the case strain

Day of disease	Case number	Agglutinins for <i>V. cholerae</i> (Inaba)	
		H	O
7	615	320	10
8	641	320	0
9	540	160	10
10	538	160	0
	653	80	10
	673	320	0
	885	320	40
11	629	20	0
14	704	610	0

(no. 821) shows H relationship to *V. cholerae*. In patients in whom inagglutinable vibrios only were isolated, agglutinins were not demonstrable for the homologous inagglutinable strain. In 3 of the 8 patients examined on the 7-10th day of the disease cholera agglutinins were found, demonstrating that infection was probably due to *V. cholerae*.

TABLE VI

Showing the titre of cholera agglutinins (on specified days of the disease) in clinical cholera patients from whom no vibrios were isolated

Case number	Day of disease	Agglutinins for <i>V. cholerae</i>	
		H	O
1245	3	0	0
1246	..	0	0
1243	..	0	0
1244	..	0	0
1241	7	0	0
816	..	320	0
726	..	0	0
767	..	0	0
778	..	0	0
841	..	0	0
723	9	640	80
761	..	0	0
765	..	0	0
807	..	160	80
850	..	40	20
1287	..	0	0
1288	..	0	0
1289	..	0	0
793	..	640	320
794	..	0	0
899	..	0	0
929	..	0	0
1233	..	0	0
1002	..	0	0

TABLE V

Showing the agglutinins (on specified days of the disease) in patients from whom *V. cholerae* and other vibrios were isolated

Case number	Day of disease	AGGLUTININS					
		<i>V. cholerae</i> (Inaba)		Homologous agglutinable vibrios		Homologous inagglutinable vibrios	
		H	O	H	O	H	O
1113	1	0	0	0	0	0	0
1108	..	0	0	0	0	20	0
814	8	320	160	80	80	0	0
821	..	640	10	640	640	80	0
875	..	40	0	320	80	0	0
847	..	320	160	320	40	0	0
874	10	320	40	40	40	0	0
903	..	20	20	N.D.	N.D.	0	0
905	..	20	10	N.D.	N.D.	0	0

In clinical cholera patients from whom vibrios were not isolated agglutinins for *V. cholerae* were found in 5 of the 20 examined on the 7th and 9th day of the disease (table VI). These are undoubtedly cases in which the infecting

organism was *V. cholerae*. The 15 cases in which cholera agglutinins were not found probably included a certain number of cases not of true cholera.

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TREATMENT OF PERITONSILLAR ABSCESS

A NEW METHOD

By K. KRISHNA RAO, B.Sc., M.B., B.S., M.R.C.P. (Edin.),
D.L.O. (Eng.)

Ear, Nose and Throat Specialist, Krishna Rajendra
Hospital, Mysore

PERITONSILLAR abscess, or quinsy, is the result of inflammation due to septic infection in the tissues adjoining the tonsil. The infection reaches the peritonsillar tissues from the infected crypts of the tonsil, which get blocked either partially or completely after recurrent attacks of acute or sub-acute follicular tonsillitis. Similarly the 'intra-tonsillar recess' or the 'supra-tonsillar fossa' very occasionally may get blocked on account of adhesions between the plica semilunaris and the enlarged tonsil during an acute attack, and favours spread of infection towards the antero-superior part of the tonsil. This explains the very great frequency of quinsies situated antero-superiorly to the tonsil, and their great tendency to recur. As explained above, however, infection may travel from any of the crypts and so quinsies at the level of the middle third and the lower third of the tonsil fossa are not infrequent.

Regarding treatment, it is very doubtful if such conservative measures as giving tincture of aconite (one minim every hour), or sodium salicylate in ten grain doses or one-sixteenth grain of tartar emetic with two drachms of liquor

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Summary

(1) From a study of a series of cholera patients it has been shown that cholera agglutinins develop on the 4th day of the disease and are found more frequently and in higher dilutions by the 7th day.

(2) H agglutinins appear early and in larger percentage of cases than O agglutinins.

(3) Agglutinins are better developed for the homologous strain than for the standard *V. cholerae* (Inaba).

(4) In a few patients H agglutinins develop for the standard strain of *V. cholerae* and not for the homologous agglutinable strain.

(5) In mixed cases, i.e., passing *V. cholerae* and inagglutinable vibrios or in cases passing inagglutinable vibrios only, agglutinins were demonstrable for *V. cholerae* and not for the inagglutinable strains.

(6) In patients in whom vibrios were not isolated, agglutinins for *V. cholerae* were found. This stresses the importance of serological test in the retrospective diagnosis of cholera in those patients in whom *V. cholerae* has not been isolated during the acute stage of the disease.

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ammonium acetate every two hours, in addition to local painting with argyrol, silver-nitrate or guaiacol in almond oil can ever abort an attack of quinsy. By the third or fourth day, when the quinsy is well established, as evidenced by congestion and œdema of the faucial pillars and the uvula, tender cervical glands and general toxic condition of the patient, the best procedure is surgical interference, in addition to such helpful measures as prompt evacuation of the bowels, rest in bed, fluids in plenty, fomentations locally and good nursing. 'Prontosil' and allied preparations are very efficacious as a supplement to surgical interference.

The surgical interference recommended by most British authorities is to drain the quinsy through the soft palate at a site slightly medial to the mid-point between the base of the uvula and the last upper molar tooth on the affected side. They all recommend removal of the septic tonsils during the quiescent interval after an attack, to avoid recurrence.

The drawbacks of the procedure are:—

- (1) It is only a longstanding abscess in the upper third of the tonsil fossa that can be drained by this palatal incision. Even in such cases, the incision drains the abscess at its upper pole instead of at the dependent pole and frequently needs re-opening.
- (2) An abscess in the mid-third or the lower third of the tonsil fossa cannot be drained by this incision and the patient will have to endure considerable discomfort for a long time before the usual palatal incision can afford relief.

In this type of case, as an emergency measure, a small incision may be made at a centimeter from its free border through the anterior pillar at the level of the middle third or the lower third of the tonsil fossa (depending on the site of the abscess) and a curved sinus-forceps gently thrust in backwards and laterally to drain the abscess.

- (3) It is very rare to find a patient coming back for tonsillectomy during the quiescent period and most probably, the patient will be seen by the doctor only with a recurrence of quinsy.

Because of these various draw-backs, many continental authorities, notably Canuyt (1934), Schroeder (1936) and some British Surgeons recommend and practice immediate tonsillectomy as a satisfactory treatment of quinsy. Tato (1933) has collected a total of 356 cases of peritonsillar abscess treated by immediate tonsillectomy, in recent years, including 29 cases of his own. There were no serious complications in any of the cases. His results are reported to have been excellent, providing a safe and quick cure of the abscesses and eliminating relapses with their possible complications. Dr. Linck of the Greifswald clinic (1932, 1934 and 1936) has treated nearly three hundred

cases of peritonsillar abscess with immediate tonsillectomy and his results have been very satisfactory. He observes that the operation is surprisingly easy since the tonsil is partially detached from its bed and the after-pain is much less than that of interval tonsillectomy.

I have so far performed tonsillectomy on both sides, in sixteen cases of quinsy, during the acute or sub-acute stage, under local anaesthesia, with very satisfactory results. Some typical case-histories are given below. It is very gratifying to note that :—

(a) *Hæmorrhage* either primary or secondary rarely occurs from the abscess side.

(b) *Pain* after the operation is more often felt on the healthy side than on the abscess side.

(c) *Septicæmia* did not develop in any case.

(d) Tonsillectomy can be safely performed either at the time of opening the abscess or, if the patient cannot open the mouth widely enough, two to five days after draining the abscess. In either case, the results are uniformly good.

I draw the above conclusions with great caution and reserve, since the number of cases under my care has been very small.

Case I.—A girl, aged 15 years, previous history of frequent 'sore throat'. Admitted on 20th March, 1938, with history of severe pain in the throat and dysphagia of four days' duration. Temperature 101°F. and pulse 110 per minute; fair volume.

Local examination.—21st March. Quinsy left side; left tonsillar gland very painful and enlarged; drained through the palatal incision and a small quantity of foul pus evacuated.

22nd March. Patient's condition very much the same as on admission. Severe pain in the throat and dysphagia present in spite of re-opening the previous incision. Temperature 101°F. Pulse 115 per minute.

24th. Both the tonsils removed under local anaesthesia. The left tonsil was separated very easily from its bed which presented a dark, irregularly granular surface. There was practically no bleeding from the left side at operation.

25th. About two ounces of blood from the right side and the tonsil fossa was found filled with clot. The clot was cleared and an adrenalin plug applied. Temperature 101°F.

26th. Dysphagia much improved. Right side is more painful than the left. Temperature 100°F.

29th. Patient discharged cured.

Case II.—A merchant, aged 25 years, admitted on 20th June, 1938. No previous history of sore throat. Present complaint, excruciating pain in the throat on swallowing during the past four or five days. Cannot talk well nor open the mouth widely. Temperature 101°F.

Diagnosis.—Bilateral quinsy.

21st. Abscess opened on both sides through palatal incisions and pus drained. Prontosil 5 c.cm. intramuscularly. Temperature 101°F.

22nd. Prontosil 5 c.cm. intramuscularly. Temperature 100°F. Pain in the throat marked; dysphagia severe.

23rd. Bilateral tonsillectomy under local anaesthesia. Tonsils were separated very easily from their beds. No bleeding. Temperature 99°F. at 4 p.m.

24th. Pain and dysphagia much improved, can open mouth well. Temperature 99°F.

25th. Can swallow milk and soft bread easily.

30th June. Discharged cured.

Case III.—A tailor, aged 28 years; admitted on 24th June, 1938, 6 p.m. Previous history of nearly twenty

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THE INTRADERMAL TEST AS AN INDEX OF VITAMIN-C NUTRITION

By SACHCHIDANANDA BANERJEE, M.B., M.Sc.

and

B. C. GUHA, Ph.D., D.Sc.

(From the University College of Science, Calcutta)

ROTTER (1937) has suggested an intradermal test for the estimation of the level of vitamin-C nutrition of the body. He has observed that

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attacks of sore throat during the last 14 months, each attack lasted three or four days. One attack of left-sided quinsy about ten months ago.

Present history of severe pain in the left side of the throat for five days; dysphagia fairly marked. Can talk well.

Local examination.—Left quinsy discharging through a crypt near the lower pole. Left tonsillar gland painful and much enlarged. No oedema of the epiglottis or ary-epiglottic folds. Temperature 101°F.

25th. 9-30 a.m. Bilateral tonsillectomy performed under local anaesthesia. Temperature 99.5°F.

26th. Patient's condition satisfactory. Can open the mouth quite well and swallows liquids with fair ease. Temperature 99°F. Discharged cured on 1st July, 1938.

Case IV.—A Mohammedan, aged 28 years; admitted on 30th January, 1939. Mother of three children. History of frequent sore throat for two or three years. Had an attack of quinsy on the left side one year back. Present history of severe pain in the left side of the throat and marked dysphagia for five days. Clinical diagnosis of quinsy—left side, confirmed by aspirating 1 c.cm. of frank pus through anterior pillar. Temperature 101°F.

31st January. Bilateral tonsillectomy under local anaesthesia. Practically no bleeding from the left side. Temperature 101°F.

1st February. Pain much less than before operation, especially on left side. Temperature 99°F.

3rd. Only slight pain on swallowing.

4th. Swallows bread and milk with fair ease.

5th. Discharged cured.

In view of the fact, that 'quinsy' patients rarely think of going back to the doctor to have their tonsils removed when they are well and free from pain, it is certainly in the best interests of the patients to remove their tonsils during the acute condition, especially since the method is quite safe, easy, and certain in its results.

It is a pleasure to acknowledge gratefully the encouragement given to me in my work by Dr. J. F. Robinson, the Durbar Surgeon and Medical Officer, Krishna Rajendra Hospital.

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when a small quantity of the dye 2 : 6 dichlorophenol indophenol is injected intradermally the colour of the dye disappears gradually. The time taken for the vanishing of the colour is stated to be dependent on the ascorbic-acid content of the skin and is related to the vitamin-C status of the body. It has been observed that if ascorbic acid is injected into an individual the time of decolorization of the dye becomes less. The time taken is much prolonged in patients suffering from vitamin-C deficiency. According to him, if the decolorization time be less than five minutes the individual is saturated with vitamin C. When the time taken is between five and ten minutes the individual is said to be normal and if it is more than ten minutes the patient is considered to be suffering from vitamin-C deficiency.

Portnoy and Wilkinson (1938) have supported Rotter's suggestion. They have examined a series of 103 patients and have found correlation between the blood ascorbic-acid level and the decolorization time.

We considered that the validity of the skin test could be examined with guinea-pigs, where ascorbic acid could be administered under controlled conditions and its effect on the time of decolorization noted. A series of guinea-pigs was therefore placed on a scorbutic diet and the time of decolorization and the change in body weight were followed. Similar observations were taken when a known supplement of ascorbic acid or a mixed normal diet was given to the animals after a period on the scorbutic diet. A remarkable correlation between the change in body weight and the decolorization time was observed.

Experiments were also carried out with three groups of guinea-pigs placed on a scorbutic diet, which was supplemented by different doses of ascorbic acid in the different groups from the start of the experiments. Observations on the decolorization time in these three groups were taken.

With a number of human subjects the urinary excretion of ascorbic acid and the decolorization time of the skin test were noted before and after administration of a definite dose of ascorbic acid. Subsequently, intradermal tests were carried out with a number of Bengali young men, mostly students, to find whether their decolorization time falls within normal limits.

Experimental

The technique of intradermal test adopted was that of Portnoy and Wilkinson (*loc. cit.*). The dye solution was prepared by dissolving 20 mgm. of 2 : 6 dichlorophenol indophenol in 49 c.cm. of freshly-boiled distilled water. The solution was taken in a sterilized rubber-capped phial which was wrapped in black paper and kept in a refrigerator. The dye solution was freshly prepared at intervals of ten days. A 'record' tuberculin syringe with metal piston was used. We preferred the V2A hypodermic needle

no. 16 to intradermal needles. 0.01 c.cm. of the dye was injected intradermally in the forearm of the human subject. The part selected for injection should be free from veins and hairs. In the case of guinea-pigs the dye solution was injected into a part of the shaved abdomen.

A. Decolorization time and change in body weight of guinea-pigs on a scorbutic diet before and after supplementing with ascorbic acid

Twenty normal healthy guinea-pigs of weights varying from 205 g. to 567 g. were taken. They were placed on a scorbutic diet containing ground oats 80 parts, ground gram 20 parts and salt 1 part. 50 c.cm. of milk autoclaved at 15 lb. pressure for 30 minutes were supplied daily and 1 c.cm. of cod-liver oil was given twice a week. Intradermal tests were performed on the shaved abdomen at intervals of one to three days, and their weights were recorded. At the beginning

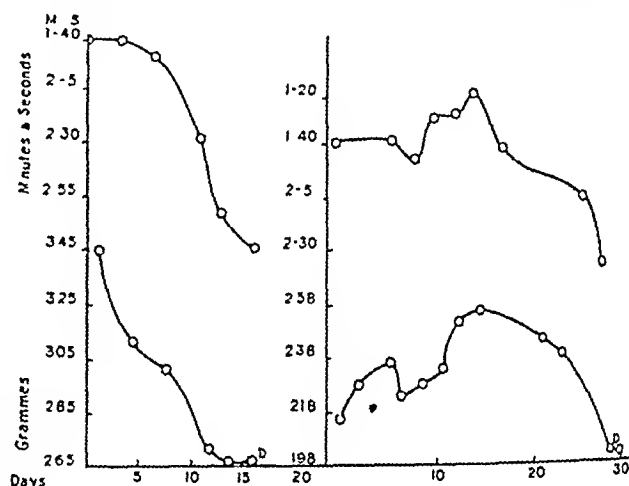


Fig. 1.

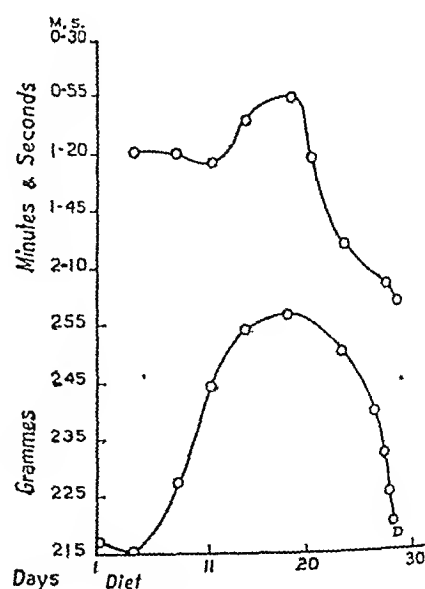


Fig. 2.

of the experiment when the body of guinea-pigs were not depleted of vitamin C the time of decolorization did not correlate with the weight, but when they were

gradually developing scurvy their weights began to fall and coincidentally the time of decolorization in the intradermal test gradually lengthened. In guinea-pigs which were allowed to

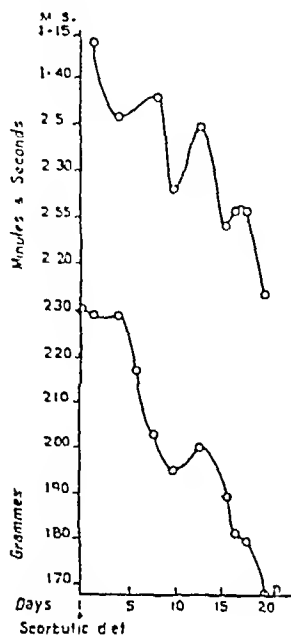


Fig. 3.

die of scurvy the intradermal test time varied from 2 minutes 30 seconds to 4 minutes 10 seconds just previous to their date of death (figures 1 to 3). To some of the guinea-pigs,

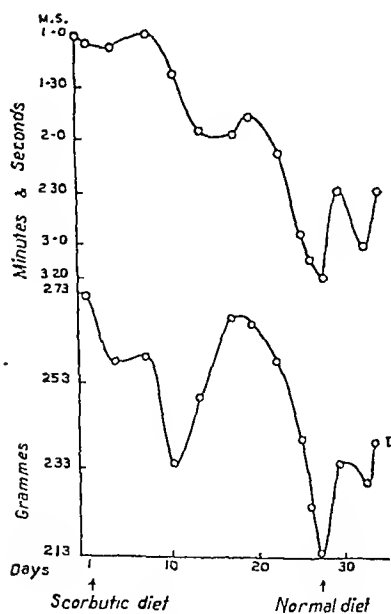


Fig. 4.

when they developed scurvy, either normal diet containing germinating gram and green grass was given or a dose of 4 mg. to 8 mg. of ascorbic acid in addition to the scorbutic diet was administered

daily. As the animals recovered they gained in weight and the time of decolorization diminished. When they attained their former weights they were again placed on scorbutic diet.

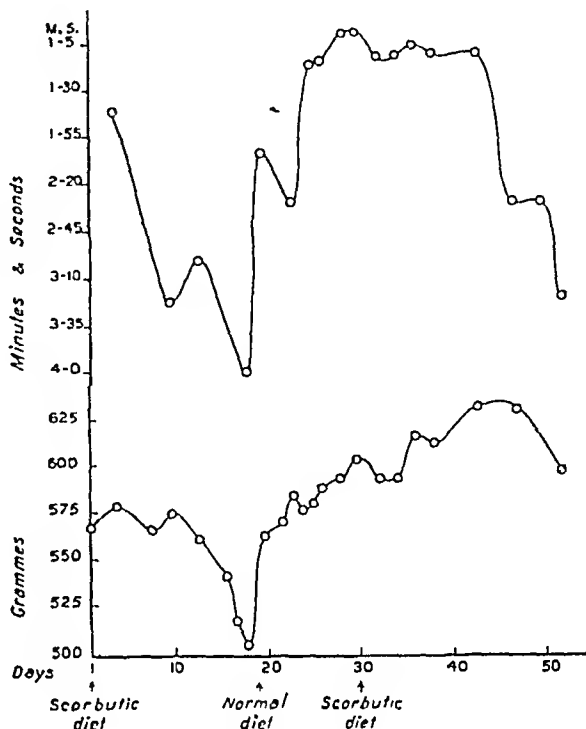


Fig. 5.

Their weight continued to increase for some time, which was followed by decrease in weight. The time of decolorization varied inversely with

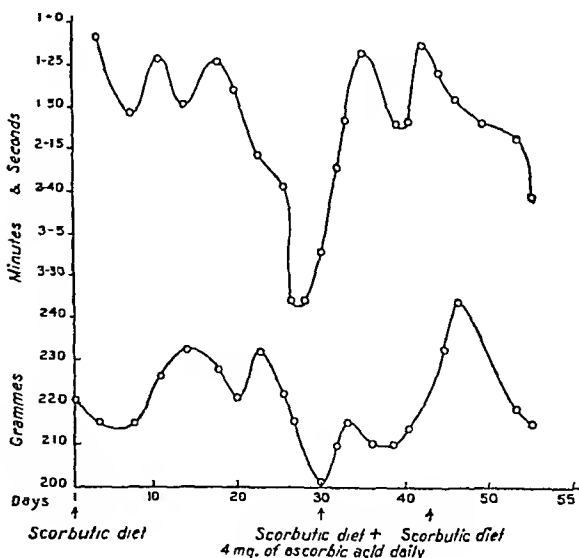


Fig. 6.

their weights. Figures 1 to 3 show the weight and the decolorization curves on a scorbutic diet. Figures 4 to 8 show similar curves before and after supplementing with ascorbic acid and in

some cases again after withdrawal of ascorbic acid.

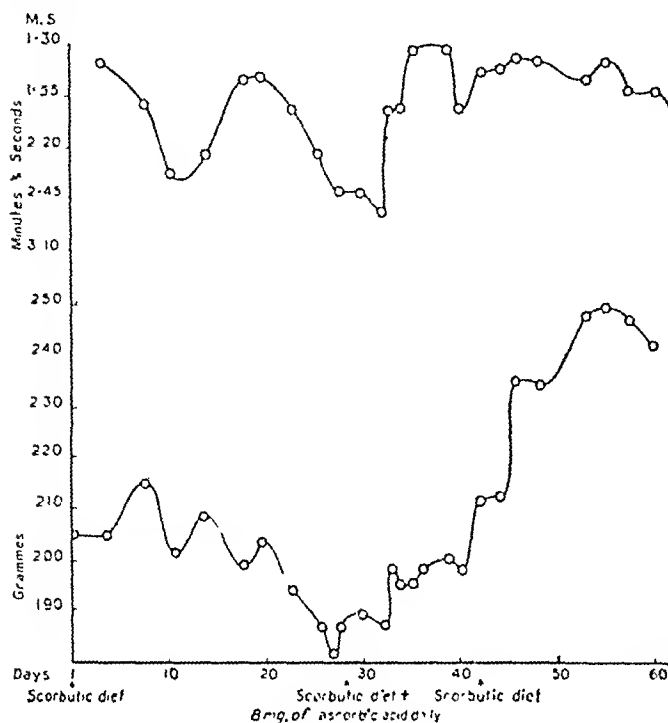


Fig. 7.

B. Decolorization time in groups of guinea-pigs receiving different doses of ascorbic acid

To note the effect of the administration of different doses of ascorbic acid to guinea-pigs on scorbutic diet three batches of guinea-pigs, each numbering five, were placed on scorbutic diet.

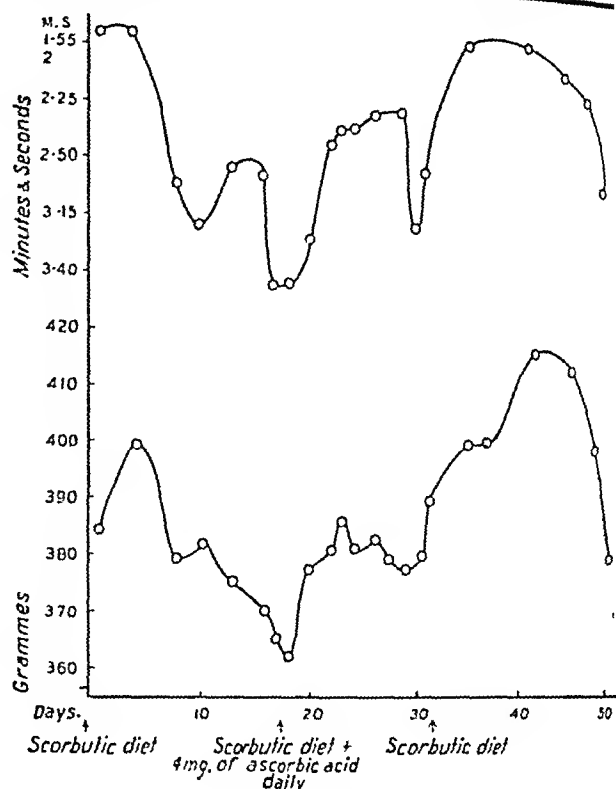


Fig. 8.

acid was considerably less than in those receiving 1 mgm. and 0.5 mgm. of ascorbic acid. The average time of decolorization in guinea-pigs receiving 1 mg. was also less than in those receiving 0.5 mg. of ascorbic acid but the difference was not considerable (table I).

TABLE I

	Guinea-pig number	Decolorization time (mean of seven days' readings)		Mean decolorization time, of group
		mins.	secs.	
Group 1 (2 mg. ascorbic acid supplement)	1 2 3 4 5	2 1 1 1 1	14 52 30 30 30	1 min. 49 secs.
Group 2 (1 mg. ascorbic acid supplement)	1 2 3 4 5	2 2 2 2 1	22 8 10 43 55	2 mins. 15 secs.
Group 3 (0.5 mg. ascorbic acid supplement)	1 2 3 4 5	2 1 2 3 2	12 44 30 10 9	2 mins. 21 secs.

They were fed 2 mg., 1 mg., and 0.05 mg. of ascorbic acid, respectively, by mouth daily for 30 days. Their weights and decolorization time were noted on alternate days. The intradermal test time for the last seven days of the experiment was measured for each group of animals. It was noticed that the average decolorization time in guinea-pigs receiving 2 mgm. of ascorbic

[Note.—The means and standard deviations of the three groups are:—

Group 1 1' 43" ± 20"
" 2 2' 16" ± 18"
" 3 2' 21" ± 32"

The mean of group 1 is significantly different from those of groups 2 and 3, but the means of groups 2 and 3 are not significantly different from each other.—
Editor, I. M. G.]

C. Decolorization time and the urinary excretion of ascorbic acid in human subjects before and after a big dose of ascorbic acid.

Nine human subjects varying from 21 to 38 years of age were chosen for the experiments. The urinary excretion of ascorbic acid and the decolorization time in the intradermal test under normal conditions were determined. Each of them was then given a dose of 700 mg. of ascorbic acid and the decolorization time was again estimated. This was done in order to see how far the ingested ascorbic acid increased the urinary output of ascorbic acid and decreased the decolorization time. If the individuals are normally receiving adequate quantities of ascorbic acid, the urinary output of vitamin C should be sharply increased by the ingestion of 700 mg. of vitamin C.

In order to estimate the total amount of ascorbic acid excreted in 24 hours, the urine was collected over pure concentrated sulphuric acid in brown hottles. The strength of the acid in the urine was 5 per cent, which, in our experience, has proved most efficient in preserving the ascorbic acid. We have mentioned elsewhere (Guha and Sen Gupta, 1938) that the most suitable method for estimating total ascorbic acid comprising ascorbic acid, dehydro-ascorbic

given in table II and the corresponding time of decolorization in the skin test (0.01 c.cm. of the dye injected into the forearm) for the different individuals before and after ascorbic acid ingestion are also indicated.

In almost all these cases a sharp rise in the ascorbic acid excretion was observed indicating that the subjects were saturated or nearly saturated with reference to vitamin C. On the other hand, it will be observed that in all cases except no. 6 there is also a sharp fall in the decolorization time in the skin test after ascorbic acid ingestion. This might be interpreted to mean that the body was not saturated and, therefore, retained a part of the ascorbic acid ingested. On the other hand, it is possible that even if the body is saturated with its normal requirements of vitamin C, extra vitamin C may accumulate, perhaps temporarily, in the skin and other organs. The present experiments are described only to indicate the apparent discrepancy between the urine and skin tests and further detailed experiments over somewhat prolonged periods are in progress to throw more light on the relationship between the urine test and the skin test and to evolve a method for the assessment of the correct vitamin-C status of the body.

TABLE II

Subject	Age	BEFORE INGESTION OF ASCORBIC ACID			AFTER INGESTION OF ASCORBIC ACID		
		True total ascorbic acid	Intradermal test time		True total ascorbic acid	Intradermal test time	
			mins.	secs.		mins.	secs.
1. (N. C.)	21	59.6	5	10	124.9	3	7
2. (G. B.)	27	39.7	6	20	75.1	5	50
3. (S. M.)	21	40.3	8	15	116.9	3	46
4. (N. B.)	23	101.7	2	25	127.2	1	36
5. (D. B.)	28	87.0	2	25	120.0	2	44
6. (I. M.)	36	84.4	1	12	130.0	1	20
7. (B. B.)	38	26.8	2	30	86.9	1	45
8. (G. B.)	27	95.7	3	0	250.6	2	25
9. (C. B.)	30	66.5	3	35	101.9	3	20

acid, if any, and ascorbigen (combined ascorbic acid), if any, appeared to be to heat the material in an atmosphere of hydrogen sulphide to reduce the dehydro-ascorbic acid and split up ascorbigen and then to titrate an aliquot against 2:6 dichlorophenol indophenol in the usual manner, after driving out the hydrogen sulphide by means of carbon dioxide or nitrogen. Another aliquot of the solution after removal of hydrogen sulphide was treated with ascorbic acid oxidase (prepared from cucumber) and titrated against the indophenol reagent. The difference between the titration values before and after oxidase treatment gave the 'true total' ascorbic acid. The results obtained by this method applied to the urine of the human subjects before and after the ingestion of 700 mg. of ascorbic acid are

[Note.—The means of the true total ascorbic acid before and after ingestion of ascorbic acid in these nine cases are 67.97 ± 25.37 and 125.94 ± 50.45 ; the difference is 'very significant' statistically. The means of the intradermal test times before and after ingestion are $3' 52'' \pm 2' 16''$ and $2' 53'' \pm 1' 23''$; these means are not significantly different from each other.—Editor, I. M. G.]

D. The intradermal test as applied to some Bengali young men

The intradermal test was applied to a number of Bengali young men, mainly students, of ages varying from 20 to 30 years and the results are shown in table III. According to Rotter's standard they seem to indicate that the vitamin-C status of these young men is within normal limits. The limiting factor for this test is, of

course, the degree of pigmentation of the skin. If the skin is too dark, it is obviously not possible to carry out the test.

TABLE III
Showing time of intradermal test

Subject	Age	Time	
		mins.	secs.
1	21	4	35
2	21	5	22
3	21	4	0
4	21	7	40
5	21	4	47
6	21	2	45
7	21	5	50
8	21	3	35
9	22	3	50
10	22	3	0
11	23	5	5
12	22	5	40
13	21	9	30
14	20	5	0
15	21	3	0
16	27	5	35
17	28	3	15
18	27	5	10
19	27	6	0
20	27	6	15
21	24	3	0
22	23	5	0
23	23	5	0
24	25	3	0
25	28	2	30
26	26	2	20
27	26	3	5
28	25	5	15
29	26	3	10
30	28	5	0
31	30	4	0
32	25	3	50
33	26	5	0
34	23	2	30
35	27	4	0
36	22	8	15
37	27	6	20
38	22	5	10
39	24	8	40
40	25	7	0
41	21	7	30

[Note.—The mean of 41 estimations in normal Bengalis is 4 minutes 53 seconds \pm 1 minute 48 seconds. The normal range may be looked upon as from 8 minutes 28 seconds to 1 minute 16 seconds.—EDITOR, I. M. G.]

Summary

(1) The accuracy of the intradermal test for the assessment of the level of vitamin-C nutrition was tested with guinea-pigs under controlled conditions. It was observed that if the guinea-pigs are placed on a scorbutic diet the time of decolorization increased approximately at the same rate as the body weights diminished, the two curves, in fact, following each other fairly closely. When normal diet or ascorbic acid was given to these scorbutic guinea-pigs, the decolorization time gradually diminished and the body weight rose at fairly equal rates. If the ascorbic acid supplement was withdrawn, the weight

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AN EXPERIMENT IN COOLIE LINE SANITATION: EFFECTS ON HEALTH

By K. P. HARE, M.B., B.S. (Lond.), L.M.S.S.A.
Medical Officer, Timgri Medical Association, Assam

Introduction.—In a previous communication (1938) I described the construction of a set of latrines for a coolie line and gave reasons for the adoption of a particular design. It has not yet been possible to estimate the effect of these latrines on hookworm incidence owing to the absence of a preliminary stool survey of the line in question (see previous report). I am, however, in a position to report on their effect on general health and happiness and on dysentery incidence and, also, on their construction.

(Continued from previous column)

curves and decolorization time curves again followed each other approximately.

(2) In another set of experiments in which three separate groups of guinea-pigs were fed on a scorbutic diet, supplemented by 2 mgm., 1 mgm. and 0.5 mgm. ascorbic acid, respectively, the average decolorization time (observed during the last seven days of experiment) with the group receiving 2 mg. ascorbic acid was considerably less than that observed with the group receiving 1 mg. ascorbic acid. The average time of decolorization with the group receiving 0.5 mgm. ascorbic acid was also less than in the group receiving 1 mgm. of the vitamin, but the difference was not considerable. It would seem, therefore, that when the dose of vitamin C begins to be low, the vitamin disappears from the skin relatively more slowly.

(3) The excretion of 'true total' ascorbic acid in the urine and the decolorization time in the skin test with nine healthy male human subjects before and after ingestion of 700 mg. ascorbic acid were observed. In nearly all cases there was a sharp rise in the ascorbic acid excretion. The decolorization time was also, however, sharply reduced except in one case. These results are discussed.

(4) The intradermal test has been applied to 41 Bengali young men, mainly students, and their vitamin-C status appears to fall within normal limits.

Our sincere thanks are due to the Calcutta University Students' Welfare Committee for a personal grant to one of us (S. B.) and to Dr. A. N. Chatterjee, secretary of the Committee, for his valuable help. We wish also to thank the Indian Research Fund Association for financing our researches on ascorbic acid.

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Effect on health and happiness.—The improvement in the morale of the coolie living in the Balimara line has been remarkable. They have always, from the very beginning, taken advantage of their latrines and have kept them clean themselves. The line is now a model of cleanliness and tidiness and one is struck by the complete absence of odour. The assistant medical officer of the estate reports a drop in the sickness figures for Balimara as compared with the remainder of the estate and the manager reports an increased wages bill owing to reduction of absenteeism. Many of the occupants of other lines have applied to be transferred there and, when told that there was no room, have agitated for similar latrines in their own lines. The management fully intend to carry out this work early in 1939.

Hookworm incidence in the line.—As mentioned above and previously reported (*loc. cit.*) it was impossible to carry out a preliminary stool survey of this line but stools were collected from a random sample of fifty-six persons from the other lines and examined. All the inhabitants of the Balimara line were given a mass treatment with oil of chenopodium (m. xxx) in March 1938. A stool survey was also carried out on the total population, one hundred and twelve persons, of an isolated line on another estate. This is acting as a control line as it possesses no sanitary amenities. Immediately after the survey (in March 1938) all the inhabitants of that line also received a mass treatment with oil of chenopodium (m. xxx). In November 1938 a second survey of the control line and a survey of the Balimara line were carried out using the same technique as before. These surveys were immediately followed by a second mass treatment using tetrachlorethylene (one drachm for adults and proportionate doses for children). The results of the surveys are given in tables I, II, III and IV. Table IV in fact probably gives a fairly accurate picture of the position in March 1938 since Hare and Dutta (1939) have shown that the absolute-cure-rate for a single treatment with oil of chenopodium (m. xxx) is only five per cent, using the mode of administration normally employed in this district.

TABLE I

Stool survey of 112 persons, being the total population of the control line, carried out in March 1938

Infection	Number infected	Percentage incidence
All helminths	103	91.9
Hookworm	97	86.6
Ascaris	54	48.2
Trichuris	61	54.4

TABLE II

Stool survey of 113 persons, being the total population of the control line, carried out in November 1938

Infection	Number infected	Percentage incidence
All helminths	107	94.7
Hookworm	94	83.2
Ascaris	77	68.1
Trichuris	59	52.2

TABLE III

Stool survey of 56 persons, being a random sample of coolies living on Dirial Tea Estate excluding the Balimara line, carried out in April 1938

Infection	Number infected	Percentage incidence
All helminths	49	87.5
Hookworm	40	71.4
Ascaris	33	58.9
Trichuris	29	51.8

TABLE IV

Stool survey of 126 persons, being the total population of the Balimara line, carried out in November 1938

Infection	Number infected	Percentage incidence
All helminths	121	96.0
Hookworm	103	81.7
Ascaris	95	75.4
Trichuris	88	69.8

The latrines also appear to have had some effect on the incidence of 'water-sores' which are most probably the result of irritation of the skin caused by penetration of hookworm larvae. The Balimara line, as is shown in table V, had previously a high incidence of water-sores as compared with the remainder of the estate. This incidence dropped during the worst months of 1938 to a figure slightly below that for the

TABLE V

Water-sore cases in Dirial Tea Estate

Line	Period of observation	Number of cases	Percentage incidence
Balimara	July 1937	21	17.5
Other lines	August 1937	102	10.3
Balimara	September 1937	11	8.0
Other lines	Do. 1938	91	9.4

remainder of the estate. That a larger drop has not been shown is not surprising in view of the established longevity of the hookworm larva.

Effect on dysentery

It was a reasonable expectation that the provision of sanitation would have some effect on the incidence of dysentery, already improved by the provision of a pure water supply. Tube-wells were sunk in other lines of the estate in May 1936 but not in Balimara until May 1937. The effect was to reduce the dysentery incidence of that line to that of the remainder of the estate. The latrine system was installed in Balimara line during February 1938. The actual effect of the latrines, though not dramatic, has been satisfactory as is shown in table VI.

TABLE VI
Dysentery on Dirial Tea Estate

Line	Period of observation	Number of cases	Percentage incidence
Balimara	June 1936 to May 1937.	9	6.9
Other lines	Do.	38	3.7
Balimara	June 1937 to February 1938.	3	2.3
Other lines	Do.	27	2.6
Balimara	March 1938 to November 1938.	5	3.5
Other lines	Do.	43	4.4

Though dysentery assumed epidemic proportion in the remainder of the estate during the summer of 1938 and gave rise to great anxiety, it never spread to the Balimara line. Of the cases reported above three arose sporadically and the other two occurred when there was no other dysentery in the remainder of the estate and there is reason to believe that they were due to consumption of infected food from the bazar. If these cases are ignored, the incidence in the Balimara line is reduced to 2.1 per cent. It would appear therefore that the problem of dysentery in tea estates can be adequately dealt with by the provision of a pure water supply and effective sanitation.

Construction

There has been no sign of caving-in of any of the bored-holes although no lining of any description has been used and the housings have stood up to the very inclement weather of the 1938 rains excellently. The use of a 'topping' of two courses of pucca bricks and the coating of the Kapax bricks with tar and crude oil have proved absolutely effective in preventing collapse of the walls due to damage by heavy rain.

Acknowledgment.—I wish to acknowledge my indebtedness to Dr. H. C. Das, assistant medical officer, Dirial Tea Estate, for his patient work in searching through his sickness records for the material embodied in tables V and VI.

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THE SOURCE OF STREPTOCOCCAL INFECTION IN PUERPERAL FEVER

By H. GHOSH, M.B., M.S.P.E. (Paris)

and

S. MUKHERJEE, M.B., D.T.M.

Department of Bacteriology, Indian Institute for Medical Research, Calcutta

PUERPERAL FEVER, so far as it has been possible to demonstrate, may be due to one or more of the following micro-organisms, viz, *Streptococcus*, *Staphylococcus*, *B. coli*, *B. welchii*. Puerperal fever due to streptococcus is the commonest. Even in well-equipped hospitals where the greatest possible aseptic precaution is taken, puerperal sepsis cannot be avoided. This induced scientific workers to search for the source of infection and streptococcus being the commonest cause of puerperal infection, investigation on the source of this micro-organism was taken up with much care and interest.

There can be two possible sources of streptococcal infection, (1) Autogenous, i.e., the patient herself can harbour a hæmolytic streptococcus in her throat which becomes virulent at the puerperium when the defensive power of the body is low, and (2) Exogenous, i.e., infection may occur from contact with medical attendants, nurses or visitors.

It was shown by Dr. Dora Colebrook that in 38.1 per cent of streptococcal puerperal infection the strains of *Streptococcus hæmolyticus*, isolated from the throats of the patients, serologically corresponded exactly to those isolated from the blood or vaginal discharge, in other words the infection was autogenous. Our investigation was directed to determining the sources of infection in this country. From obvious difficulties in collecting materials from visitors to the maternity cases we could not ascertain directly as to how far contacts were responsible for the source of infection by *Streptococcus hæmolyticus*.

Method of investigation.—Materials for investigation were collected from Baldeodas Maternity Home, Medical College Hospital and Calcutta Medical School Hospital.

As soon as a maternity case was admitted into the hospital one swab from the throat was taken and the streptococcus, if any, was isolated. Hæmolytic and non-hæmolytic strains were grouped separately. Subsequently, if any case developed puerperal fever, one or sometimes two on different occasions, vaginal swabs were taken to find out if there was any streptococcus (either hæmolytic or non-hæmolytic) present.

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High titre sera were prepared from 21 strains of *Streptococcus hemolyticus* isolated from the throat or other sources and 8 different serological groups were obtained. These high titre sera were used to determine the agglutinability of the strain of streptococcus isolated from throat and vaginal swabs of patients who developed puerperal fever, by both direct absorption of agglutinin method, for the precise identification of each serologically homologous group of *Streptococcus hemolyticus*.

Bacteriological technique

Preparation of high titre serum.—All the high titre sera prepared, gave agglutination with an homologous strain in 1 in 1,000 dilution or higher.

After the high titre sera were prepared these were tested serologically to find out whether they belonged to different groups. From these 21 high titre sera, we were able to obtain 8 serologically different groups, which would agglutinate most of the streptococci isolated from throat or vaginal swabs of our series.

Serological identification of the different strains of streptococcus.—A direct agglutination test was made with all the different groups of high titre sera. When agglutination was found to be strongly positive, absorption test was performed for confirmation.

Many strains showed auto-agglutination. It was found, as suggested by some workers, that by culturing at a temperature between 22°C. and 26°C. auto-agglutination could be avoided in most cases.

Result

Seven hundred and fifty maternity cases were examined, of which only 44 developed fever during the puerperium. Of these 44 cases 3 showed *Streptococcus hemolyticus* in the throat swab and 17 showed it in vaginal swabs and 1 non-hemolytic streptococcus was isolated from the vaginal swab.

The result is given in the tables below :—

TABLE I
Incidence of puerperal fever

Total number of cases examined	Number of puerperal fever	Percentage of puerperal fever
750	44	5.86

TABLE II
Incidence of Streptococcus hemolyticus in throat and vagina in cases of puerperal fever

Number of puerperal fever	Number of hæmolytic streptococcus in throat	Number of hæmolytic streptococcus in vaginal swab
44	3	17

TABLE III

Cases where hemolytic streptococcus was found both in throat and vaginal swabs

Number of cases in which hæmolytic streptococcus was found in both vaginal and throat swabs	Number of cases in which hæmolytic streptococcus of throat and vagina corresponded serologically
3	1

TABLE IV

Incidence of streptococcus in vaginal swabs before confinement

Number of vaginal swabs examined before confinement	Number of hæmolytic streptococcus in vaginal swab	Number of non-hæmolytic streptococcus in vaginal swab
50	1*	4†

* Normal puerperium.

† Of these, two cases developed severe puerperal septicæmia yielding to anti-staphylococcus serum promptly.

TABLE V

Incidence of streptococcus in vaginal swabs of cases with normal puerperium

Number of vaginal swabs of cases with normal puerperium	Hæmolytic streptococcus	Non-hæmolytic streptococcus
51	1*	5

* No hæmolytic streptococcus found in the throat swab of this case.

Discussion of results

Fifty vaginal swabs were examined before confinement, 4 only showed non-hæmolytic streptococcus and one only showed hæmolytic streptococcus. Except two cases which had very high temperature during the puerperium and where non-hæmolytic streptococcus was isolated from vaginal swabs, all the rest had normal puerperium. These two cases, however, yielded promptly to anti-staphylococcus serum but did not show any result with anti-streptococcus serum or prontosil treatment.

Fifty-one vaginal swabs from cases with normal puerperium were examined. Five showed non-hæmolytic streptococcus and one only showed hæmolytic streptococcus but in the throat swab of this latter case no hæmolytic streptococcus was obtained.

It will be evident from the above results that except in one out of 17 cases of puerperal fever due to *Streptococcus hemolyticus* the source of infection was not from the throat of the patient

(Continued at foot of next page)

CLINICAL NOTES ON THE TREATMENT OF ACUTE CARDIAC BERI-BERI

By MIN SEIN, M.B. (Cal.), M.R.C.P. (Lond.)

CAPTAIN, I.M.S.

General Hospital, Rangoon

BERI-BERI is prevalent in the urban areas in Burma, particularly in the seaport towns of Rangoon, Moulmein, Bassein and Akyab. The incidence of the disease falls largely upon Telegu coolies and Chittagonian labourers or artisans whose staple diet is rice. On account of poverty these people have to depend on the cheapest variety of rice and their diet is also otherwise deficient in essential constituents.

The disease is quite well known amongst the Burmese who have special names for the wet as well as the dry types. It generally affects coolies employed by big firms, who have to work for months in the jungle, e.g., forest work. The paralytic or polyneuritic type of the disease, which generally runs a chronic course in Burma, is uncommon amongst the native population as probably the patients get back to better conditions after the field work has been done and they can get a diet which satisfies the nutritional requirements.

From accounts given by coolies the acute type is not uncommon amongst the Burmese but cases are not often admitted to hospital hence opportunities for their study are not easily obtained.

In Bassein civil hospital the majority of patients come from the Telegu and Chittagonian groups and the disease is of the chronic type requiring institutional treatment for months.

(Continued from previous page)

herself. Only 38.63 per cent of cases of puerperal fever were due to *Streptococcus hæmolyticus*. Taking into consideration the experimental error, delay in delivery of collected materials, the percentage of streptococcal puerperal fever might have been, in our opinion, higher than the figure we obtained. In one case of puerperal septicaemia where no streptococcus was isolated either from vaginal or throat swabs the patient developed severe erysipelas which yielded promptly to anti-streptococcus serum. There was no mortality among the cases examined.

Conclusion

1. A large percentage of puerperal fever in this country is due to *Streptococcus hæmolyticus*.
2. Autogenous infection occurs only in a very small percentage of cases. The source of infection seems to be mainly exogenous.
3. Puerperal fever due to staphylococcus was not infrequent.
4. In hospital cases examined, the percentage of mortality from puerperal fever is low.

Therefore the appearance of stray cases of acute cardiac type is likely to be overlooked.

The dramatic nature of the onset of the acute cardiac type of beri-beri and the clinical appearance of the case are striking. The rapidity of heart failure and death in untreated cases, and even in cases which die in spite of treatment, warrants the disease being classed as a medical catastrophe.

Experience shows that the attempt to treat such cases with a set beri-beri diet consisting of red rice, bean sprouts, raw onions and other green vegetables is practically useless. Even the addition of marmite and the more recent preparations of vitamin B in therapeutic doses are of no avail.

Clinical features

In hospital cases the patients are desperately ill on admission and present the picture of acute heart failure with dilatation. In other cases the patient suddenly develops these symptoms whilst under treatment for beri-beri. There is marked orthopnoea with cyanosis and restlessness. The patient fights for breath as during an attack of asthma, but he is too ill and weak to sit up. The face is purple and appears bloated and the veins in the head and neck are frequently dilated and tortuous. There may be oedema of lower extremities or, in cases which have survived the attack for a few days, there may be some degree of general anasarca. On physical examination the following features are noticed:—The heart is dilated, the cardiac sounds are muffled and there may be a tic-tac rhythm. The pulse is rapid and may be imperceptible at the wrist. The blood pressure is consistently low. There are other signs of congestive failure such as enlarged and tender liver, oedema of feet or general anasarca, and basal congestion in the lungs. Frequently the patient complains of epigastric pain and vomiting.

Before patients die, respiration appears to become ineffective and gasping, and the heart seems to go into a state of flutter.

The post-mortem appearance consists of an extremely flabby heart and signs of acute passive congestion in the lungs, liver and other viscera.

Case 1.—A Burmese male, aged 34, was admitted to Rangoon General Hospital at 6.45 a.m., and the following history was obtained from his companion as the patient was too ill to give it himself.

During the twenty days before admission the patient suffered from feeling of tiredness, breathlessness on exertion and headache. Acute symptoms with scanty micturition, inability to walk, pain in epigastrium and calf muscles developed within the last three days.

The patient was a well built and plethoric type of individual. He was extremely ill and the face had a purple hue with prominent and tortuous veins in the temples and neck, and marked visible pulsation more prominent on the right side. The fingers and toes were also cyanosed and cold. There was extreme orthopnoea and restlessness. The heart was dilated and the sounds were muffled and weak. The pulse was soft and the rate was 72 per minute. There was congestion in the base of the lungs and the respiration was shallow and hurried, its rate was 40 per minute.

THE INCIDENCE OF PLAGUE IN MAWCHI MINES AND THE ADVANTAGE OF ADOPTING EARLY PREVENTIVE AND PROPHYLACTIC MEASURES

By E. R. JAMES, M.B.E.S. (Eng.), L.R.C.P. (Lond.)

Medical Officer, Mawchi Mines, Ltd., Mawchi

MAWCHI MINES are situated on the south side of a steep hill in the mountainous tract of the independent state of Karenni, Burma. The mines cover an area of roughly 2 square miles, and have a population of about 10,000 inhabitants, about 5,000 of whom are employed by the Mawchi Mines Company. Of the remainder,

(Continued from previous page)

association with the usual anti-beri-beri diet, consisting of marinite, red rice, bean sprouts, raw onions and other green vegetables. Eggs were added to provide the proteins in the diet. Massage and electrical stimulation of the muscles were used as adjuncts to the treatment.

After this study was well on the way I had the good fortune to read a report by Hawes (1938) on the same subject which was most illuminating. Professor Hawes believes that the effect of one dose is lasting. Case 1 in the second series illustrates that the acute symptoms can recur in spite of having received 20,000 units of Betaxin.

Summary

(1) Notes of ten cases of acute cardiac type of beri-beri are given to illustrate the clinical features of the condition.

(2) The urgency of the condition and the poorness of the prognosis when intensive treatment could not be given early were demonstrated by the cases in the first series.

(3) The dramatic relief, obtained in cases which could be treated with fairly big doses of vitamin B₁, is recorded by the cases in the second series.

(4) The average dose given was 3,000 units of Betaxin intravenously in glucose solution.

(5) Further maintenance doses are recommended to prevent a recurrence of the acute symptoms.

Havero Trading Co. supplied some of the Betaxin used. This and the reports in medical literature of its efficacy led me to use this preparation for the above cases. I expect similar preparations by other reputable firms would be equally efficacious. The above cases were under my care during the period I acted as second physician at the General Hospital, Rangoon. My thanks are due to my assistant Dr. R. K. Raman and my house physician Dr. R. Edwards for their keen interest in the above study. Credit is due to Dr. Raman for the prompt treatment of the last case.

REFERENCE

Hawes, R. B. (1938). *Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XXXI, p. 474.

about 40 per cent are families of employees. The others are shopkeepers, cultivators and local inhabitants.

About 80 per cent of the population reside in four camps. Overcrowding and congestion of habitations are necessarily marked owing to the difficulty of obtaining adequate residential sites on the precipitous hill sides.

The four main camps are:

- (1) Mill camp, situated in the valley, 2,000 feet above sea-level.
- (2) Lokhaloe camp, situated at the western end and 3,000 feet above sea-level.
- (3) Mine camp, situated just below the crest of the main hill and 4,000 feet above sea-level.
- (4) Camp 13, situated on the eastern spur and 4,000 feet above sea-level.

Communication between Mawchi Mines and the outer world is by two main roads:

(a) The Mawchi-Toungoo road—A metalled motorable road constructed by the company, which winds by steep up-and-down gradients for over 100 miles across nine ranges of hills.

(b) The Taunggyi-Loikaw-Mawchi road—Another road similar to the above, but not so steep. About 200 miles long connecting Mawchi with Loikaw, the capital of Karenni State, and Taunggyi, the capital of the Southern Shan States.

Plague was prevalent at:

- (a) Toungoo from August 1938.
- (b) Taunggyi from May 1938 to January 1939.
- (c) Mawchi Mines from December 1938 to February 1939.

This was the first occasion of the occurrence of plague in Mawchi Mines area, so that it could be considered as 'virgin soil' and the congestion of human habitations with overcrowding in the camps and the presence of a fair-sized rat population had the stage all set in favour of a severe epidemic should plague visit Mawchi.

Anti-plague measures adopted:

1. Rats were regularly trapped and destroyed. Periodic spleen smear examinations were made of any unhealthy looking rats.

2. Towards the end of November 1938 a smear was returned positive to *Bacillus pestis*.

3. Steps were immediately taken to ensure a sufficient supply of anti-plague serum to protect the whole community.

4. A rigorous rat destructive campaign was instituted. Two cyanogas appliances were purchased. Rats were destroyed by rat poison-bait, trapping and gassing. 2,095 rats were known to have been destroyed by the medical department alone by the above means during December 1938, January 1939 and February 1939.

5. General sanitation conditions were improved and enforced with a view to discouraging

to be unsuitable. When fresh medium is inoculated with a young culture readings can be made after incubation overnight.

Interesting results were obtained by making stab inoculations in semi-solid agar containing specific agglutinating sera. With non-motile bacilli (which contain O antigen only) there is no difference in the amount or character of growth in the specific serum agar and the control tube. With motile bacilli the presence of specific serum prevents the spread of growth from the line of inoculation and the growth resembles that obtained from a non-motile bacterium. The arrest of motility in specific serum agar is not a permanent feature and sub-cultures on nutrient agar soon restore the motility of the organism.

A series of 14 species of salmonellas were inoculated into semi-solid agar containing different specific sera. The results obtained are shown in tabular form. From this table it is seen

(1) Paratyphosum A serum (a:—) inhibits the motility of paratyphosum A only.

(2) Senftenberg serum (g, s:—) inhibits its own motility and that of enteritidis (g, o, m:—) and calcutta (g, o, m:—). The enteritidis and calcutta sera inhibit the motility of enteritidis, calcutta and senftenberg. The specific flagellar antigen 'g' is present in these three strains, and antibody to this antigen alone is sufficient to arrest the motility of these organisms.

(3) Paratyphosum B serum (h: 1, 2) inhibits the motility of paratyphosum B and retards the motility of *Bact. cholerae suis* var. *kunzendorf* (—: 1, 3, 4, 5) but has no effect on the motility of other organisms containing the non-specific antigens 1 and 2 such as typhi-murium, stanley, newport and aberdeen. The partial inhibition

of kunzendorf by paratyphosum B serum suggests that there is some other common flagellar antigen in these two organisms.

(4) Typhi-murium serum (i:1, 2, 3) inhibits the motility of typhi-murium and that of aberdeen (i:1, 2, 3). There is no effect on the motility of organisms possessing the same non-specific flagellar antigens but not the same specific flagellar antigen. It appears that it is the antibody to the specific antigen which is concerned in the inhibition of motility.

(5) Stanley serum (d: 1, 2) inhibits the motility of stanley and that of typhosum (d:—) and not of the other bacilli containing non-specific flagellar antigens 1 and 2. Typhosum serum (d:—) inhibits the motility of typhosum and that of stanley. Both these contain the flagellar specific antigen d.

(6) Paratyphosum C serum (c:1, 4, 5) inhibits the motility of paratyphosum C and that of kunzendorf (—: 1, 3, 4, 5). Kunzendorf serum arrests the motility of kunzendorf and partially inhibits that of london but has no effect on the motility of paratyphosum C or any of the other bacteria. London serum (1.v:1, 4, 6) arrests the motility of london and partially inhibits the motility of kunzendorf.

From the results obtained it appears that the main factor in the arrest of motility of a bacterium in stab-culture in semi-solid agar containing serum is the presence in the serum of antibodies to the specific flagellar antigens. In organisms which are permanently in the non-specific phase such as kunzendorf, motility is arrested by its own serum. The reasons for the partial retardation of the motility of london by kunzendorf serum and *vice versa* cannot at present be stated.

The results recorded suggest a new and interesting line of approach to the antigenic analysis of 'H' antigens of motile bacilli.

REFERENCE

Tittsler, R. P., and Sandholzer, L. A. (1936). *Journ. Bact.*, Vol. XXXI, p. 575.

* The flagellar antigens are given in brackets.

† This is a new species of *Salmonella* the description of which is in the press.

A Mirror of Hospital Practice

TWO INTERESTING NERVOUS CASES*

By RASAMAY BHATTACHARYYA, L.M.P. (Assam),
D.T.M. (Cal.)

Bokpara Tea Estate, Doom Dooma, Assam

(1)

A case of acute ascending myelitis

A MALE, age 30 years, caste Munda, lorry driver, was admitted into hospital on 8th July, 1938, with complaint of inability to sit or stand; duration 1 day.

* Read at a meeting of the Assam Frontier and Budla Beta Medical Society held on the 25th February, 1939.

Family history.—Nothing of importance.

Previous illness.—Excepting occasional attacks of malaria, his health has been generally good.

Present illness.—On the evening of 8th July, after return from work he felt pain all over the body accompanied by fever. The next day he attended the outdoor dispensary and the compounder in charge gave him a dose of sodium salicylate mixture (grs. xx to an ounce). On the following day he again attended the outdoor dispensary and took a dose of purgative (two ounces of saturated solution of magnesium sulphate). On the 8th July he was unable to sit

or stand and was brought to hospital where he was admitted as an in-patient.

Condition on admission.—General appearance fairly good. Pulse rate 90 per minute, temperature 97°F. which rose to 99°F. at midday. Bilious fluid was vomited twice. Tongue coated and moist. Bowels not moved. Urine retained. Flaccid paralysis of the body from the feet to the lumbo-dorsal junction. By the evening of the same day, the paralysis had extended upwards over the thorax and upper extremities with the exception of the fingers.

General symptoms.—General weakness and bodily discomfort; mental state clear; pyrexia and pain absent.

Muscular system.—no spasm or tremor; no atrophy; complete paralysis of the lower limbs; co-ordination lost; sense of passive position, passive movement and kinæsthetic sense unaltered.

Reflexes.—

Deep—knee jerk, ankle jerk and wrist jerk lost, elbow jerk present; no ankle clonus.

Superficial—Babinski absent; skin reflexes absent over paralysed areas; conjunctival and palatal reflexes present.

Electrical examination—not done.

Special senses and cranial nerves—unaffected.

Cutaneous sensibility—sense of touch, pain, pressure, heat and cold all lost over paralysed areas.

9th July—hicough and retention of urine; partial loss of power of the fingers as well.

10th—condition same.

11th—hicough and retention of urine persisted; there was involuntary discharge of semen.

12th—brain somewhat confused.

13th—sphincter control lost, leading to involuntary evacuation of bowels; some wasting of the lower extremities.

14th—wasting of the whole body specially marked in the lower extremities with distortion of the right foot; difficulty of deglutition; bed sores developed; patient looked somewhat exhausted.

15th—condition about the same.

16th—wasting and exhaustion more marked.

17th—persistence of all the above symptoms; patient semiconscious.

18th July—death due to exhaustion.

(2)

A case of Landry's paralysis

A male, age 40 years, caste Munda, was brought to hospital on 14th July at about 10 o'clock with complaint of inability to stand. He had worked as usual the previous day but noticed this disability early in the morning when he attempted to get up from the bed. Nothing was known about his family history and except over-indulgence in alcohol, there was nothing particular in his personal history.

Condition on admission.—General appearance good and robust. Pulse rate 80 per minute, temperature 99°F. Flaccid paralysis of both the legs; knee jerks and ankle jerks lost; Babinski's reflex absent. In three hours' time paralysis extended to the thighs. Next day the abdominal muscles were found to be paralysed. On the third day paralysis spread to the thorax, upper extremities, neck and face. No wasting or sensory disturbance were noticed. No bed sores developed. Sphincters were unaffected. The patient died of respiratory failure on 20th July.

Comments

(1) In the experience of the writer, both these cases are of rare occurrence in tea garden practice in Assam.

(2) They occurred almost simultaneously in the same caste of people and had a rapid and fatal termination suggesting some ætiological connection in the nature of infection.

(3) Both the cases had close clinical resemblance but Landry's paralysis was differentiated from ascending myelitis (i) by the absence of sensory disturbance and of atrophic changes and (ii) by the retention of sphincter control.

Acknowledgment

I am grateful to my chief Dr. H. L. Slaughter for his valuable guidance and kind permission to publish these case notes.

A LACERATED SEPTIC WOUND OF THE TONGUE TREATED WITH COD-LIVER OIL

By J. C. DUTTA, L.M.P.

Assistant Medical Officer, Rajah Alli Tea Estates Ltd., Hoogrijan P. O., Assam

A LIXE CHOWKIDAR, aged about 35, was admitted into the Rajah Alli Tea Estate hospital with a lacerated wound of tongue.

The injury was the result of a fall from a cycle. The tongue was badly torn in the middle and there was severe hæmorrhage. On the following day the patient could not talk as the tongue was very badly inflamed and tender to touch.

I at once gave him liquor ferri perchloridi gargle which stopped the hæmorrhage. On the second day I found that a very bad odour was coming from the patient's mouth. I then gave him Sanitol gargle four times a day. The wound was full of sloughs and I tried Monsol also without success. I finally applied cod-liver oil to the wound and after a week I found that the sloughs were almost gone and the ulcer was clean and healthy. The separated portion of the tongue was united and there was no offensive smell. By the second week the patient had recovered completely.

I am indebted to Dr. K. P. Hare for his permission to publish this note.

A CASE OF AORTIC ANEURYSM

By MOHD. MOHSIN ALI ABBASI, M.B., B.S.

Ripon Hospital, Simla

A HINDU MALE, aged 45 years, hawker by occupation, was admitted to the Ripon Hospital, Simla, on the 8th March, 1939, complaining of a swelling over the front of the upper part of the left side of his chest; duration—2½ months.

The patient stated that some time previous to the appearance of the swelling he suffered from pain in both his arms for which he took some indigenous drugs from a *vaid* in the Hills. The pain was relieved, but the present swelling appeared and was attributed by the patient to the collection of some impure elements of his body.

He had been engaged in his occupation as hawker, which involved the carrying of fairly heavy loads on his head, up to within a few days of his admission into the hospital. No history of venereal disease was forthcoming, but the probability is that he had been infected with syphilis, a disease which is rampant in the Simla Hills.

Physical examination

Local condition.—There was a large tender, soft, fluctuant, convex, somewhat lobulated swelling measuring 5 inches vertically by 6 inches transversely which extended from the right sterno-clavicular joint to the middle of the left clavicle and from a level just below the thyroid notch on to the left side of the neck, down to the level of the 2nd left rib, covering the manubrium sterni. The swelling displayed marked expansile pulsation. There was a round, dry, brown scab about one inch in diameter on the skin over the summit of the swelling which had been produced by application of some counter-irritant.

Heart sounds in the mitral and tricuspid areas were feeble, no sounds were heard over the pulmonary and the aortic areas, nor over the swelling.

The radial and brachial pulses were not perceptible, pulsation in both the femoral arteries was feeble.

The pupils were normal, regular and reacted equally on both sides.

The patient's general health was poor. He was very anæmic and ill-nourished. The tongue was red and fissured, and the teeth were unhealthy. The liver and spleen were not enlarged. The temperature was elevated to the region of 100°F. He had a troublesome cough and crepitations were audible over the lungs. The circumferential extent of the swelling in the coronal plane is evident in the print of the x-ray film which is given below:—



On 10th March the patient sank rapidly, and retaining consciousness almost to the end, he died at 10-25 a.m. on that day.

On 12th March a necropsy was performed by the civil surgeon, Simla, which revealed a large aortic aneurysm extending from just distal to the aortic valve as far as the commencement of the descending aorta. The sternomastoid muscles were stretched over and closely adherent to the wall of the sac. The sac was full of blood clot which weighed 1 pound and 8 ounces. The greater part of the clot was soft and

red. The wall of the sac was lined by pinkish-white organized thrombus.

The inner lining membrane of the sac showed irregular diffuse atheromatous thickenings. The heart was not enlarged and its valves were healthy.

The orifices of the great vessels springing from the aortic arch could not be detected from within the sac. The manubrium sterni had been almost completely destroyed. There remained only a ragged remnant at its junction with the body of the sternum extending up obliquely to the right first chondro-sternal joint. The cartilage of the left first rib was missing, the ragged sternal extremity of the left first rib abutted on the sac wall. The right first chondro-sternal junction was intact.

The right sterno-clavicular joint was destroyed exposing the intact articular sternal end of the clavicle.

The medial half of the left clavicle was destroyed, the ragged end of the remnant abutting on the sac wall.

The lungs showed capillary bronchitis with frothy and muco-purulent secretions in the bronchioles.

The stomach, small and large intestine, spleen and bladder were normal.

The liver and kidneys were congested. The brain was congested and cedematous.

My thanks are due to Lieut.-Colonel A. Sargood Fry, I.M.S., Civil Surgeon, Simla East, for his permission to send these notes for publication.

TREATMENT OF A CARBUNCLE (NON-DIABETIC) PATIENT WITHOUT ANY SURGICAL INTERFERENCE

By J. B. DAS, M.B. (Cal.)

Kodarma, Hazaribagh District

A MALE, aged 38 years, came to me on 22nd February, 1939, with a very extensive ulcerated non-diabetic carbuncle, on his left scapular region. The whole of the back on that side was cedematous, and red, extending over the shoulder and front half of the chest. He was running a temperature of 103°F. The pulse was rapid and tongue coated. On that day magnesium sulphate compress (saturated solution) was applied, and mistura alba was given. Prontosil album, one tablet three daily by mouth, was given for the first three days. With the application of magnesium sulphate, and prontosil, the spread was checked. On the third day the temperature came down to normal with the localization of the abscess, after that I applied cod-liver oil dressing for 12 days—the dressing was changed, twice daily for the first six days and once a day for the next six days. The slough disappeared very quickly without any surgical measures. Healthy granulations formed in a very short time and the size of the ulcer gradually became very small. On the 12th day it was found that the base of the ulcer was quite healthy with a very scanty discharge. Next I applied scarlet red ointment on lint over the margin as well as over the ulcer and the dressing was removed after 48 hours and the ulcer totally healed up on the 25th day, that is on 18th March, 1939. The skin grew over the part without any scar.

Points of interest are:—

1. The immediate effect of prontosil and magnesium sulphate compress for checking the spread of the disease.
2. The effect of application of cod-liver dressing.
3. No incision required.
4. No scar formation.

Indian Medical Gazette

JUNE

INFANT MORTALITY

THERE is ample evidence during the last few years that the people of India are rapidly awakening to the importance of preventive medicine, which until comparatively recently was almost wholly the province of public health officials. The people are now beginning to form town and village health organizations in an effort to help themselves towards a better state of life in respect of better food, general living conditions and improved sanitation, all of which things will automatically bring about a reduction in disease incidence.

One of the most important branches of preventive medicine is that devoted to the care of the expectant mother, which results in the birth of a stronger infant. But to be effective this must be followed up by care of the child after its birth because even if the baby does not acquire a definite and possibly fatal disease in the first few months of its life (an all too frequent occurrence in India), if not properly nourished and protected from infections of various kinds, retardation of development both physical and mental will occur. This results in a lowered resistance to disease from which the individual never fully recovers and so a large population foredoomed to an indifferent state of health will grow up, and thus the health standards of the adult population will be lower than they should be and at the same time there will be the tendency to the propagation of a further generation of individuals who will be below par from the moment of conception.

We draw the attention of our readers to a paper elsewhere in this issue written by a worker who is engaged upon maternity and child welfare work which will well repay study by all persons interested in the improvement of the national health and physical standards. This article indicates what a long way we have to go in this country before we approach to the standards of European and American infant welfare results. Among the countries inhabited by a population chiefly of European origin, which practically always appears near the top if not actually leading in health statistics of almost any kind, is New Zealand. Probably the chief reason for the pre-eminence of New Zealand is that it is a relatively small country with a correspondingly small population and hence advanced health organizations and regulations are much easier to introduce and enforce than in a large and more thickly populated country. On this account it is clear that the task in India will be very difficult because in addition to a vast area

and an enormous population are the added factors of a low standard of education in general, and varying religious beliefs and social customs among the numerous races it contains.

One of the chief things that hinders the efficient working of public health services in India is the absence of reliable registration of births and deaths and especially the correct diagnosis of the cause of death. This deficiency is referred to in practically every public health report in India that one picks up, and in the immediate future it seems that there is not much prospect of much general improvement, although efforts are being made in certain restricted areas to acquire correct statistics of infant mortality and morbidity, as is indicated in the paper referred to above. The few reliable figures available show the infant mortality to be appallingly high compared with many other countries, but on account of the high birth rate this great wastage of child life is not obvious to the casual observer.

Although the people will be able to do a great deal for themselves if they are taught how to feed their children properly and how to prevent them acquiring diseases, the difficulty will be to find a sufficient number of teachers for the innumerable village communities throughout India. The local medical practitioner is the ideal teacher, but there is at present a state of unequal and unsatisfactory distribution of trained medical men and women, for it is an oft-repeated complaint that the cities and larger towns attract the majority of doctors so that the profession is badly overcrowded in these places, and wide areas of the country districts are without any medical help at all.

This is a problem, the solution of which is not at present obvious because there is no method of compelling private individuals, either doctors or others, to reside in any given place, so that the relieving congestion of doctors in the towns and increasing their numbers in the villages cannot be enforced. It will therefore be necessary to try and find some means whereby doctors may be induced to live in the country districts. The greatest bar to the migration of doctors from the cities to the villages is the financial one, because it is very hard for a doctor to make a living from the villagers, the majority of whom are extremely poor.

It is looking a long way ahead, but it seems possible that in time the State might be able to introduce some form of national health insurance such as is working now in many other countries, and that even minute annual contributions from the enormous rural population of India might provide sufficiently lucrative posts to induce more medical men to settle in the country districts. It is only by getting medical practitioners distributed throughout the land and all deaths correctly certified that the chief causes of death can be definitely ascertained, particularly among infants, and following this information the correct preventive measures can be instituted.

Special Article

INFANT MORTALITY IN INDIA*

By B. MUKTHA BAI, M.B., B.S., D.M.C.W.

*Assistant Professor of Maternity and Child Welfare,
All-India Institute of Hygiene and Public Health,
Calcutta*

THE infant mortality rate is the number of infants that die for every 1,000 children born alive each year. This rate is very high in India. Yet the public and the authorities concerned have not paid much attention to this very important problem. The reason, I suppose, is the high birth rate, which to a great extent obscures the issue. But as in other countries, as the economic stress and strain on the parents are becoming acute, and as they are realizing more and more their responsibility to their children, this birth rate is bound to fall. Other nations became alive to the fact when they saw the birth rate actually rapidly falling. Why should we not learn a lesson from them and begin our work earlier than they did? When they detected it, these countries could initiate a very intensive campaign against infant mortality. That required money and they could spare it. But we are not in that fortunate position. So it is better for us to prevent than cure. For adequate control of such work, proper registration of births and deaths is essential. Deaths are always better registered than births. Only in recent years is the registration of births also becoming better. For example in half Ward 8, Calcutta, the percentage of births registered was in 1934—63, in 1935—78, and in 1936—81 of the total births detected. So the infant mortality rate appears to be falling as the denominator of the factor is increasing. In truth, the total number of infants dying every year may be the same or increasing. Again the birth rate might have already begun to fall, because, in spite of improved registration, it was 38 in 1910, 35 in 1930 and 35 in 1936. Both these facts prove that we have no time to lose.

The above considerations show that unless we have stricter registration, made compulsory by legislation, we can neither rely upon the data evolved nor can we watch the progress of our welfare work. Also, we cannot compare our death rate with that of other countries.

However it may be, it cannot be denied that we have a very high infant mortality rate. No civilized country ever had the high infant death rate we have to-day. Though for British India it is said to be 162.4 per thousand live births in 1936, the Report of the Health Officer of Calcutta for 1935 records as high a figure as 338 per thousand live births in district III. In Great

Britain in 1899 when it went up to 162 per thousand live births, it created great alarm and the press and the public were said to be too saturated with the problem of reduction. But now, at this stage of civilization, when we are having more than double that number how many are aware of it? One wonders how long we can remain in this state of blissful ignorance about this most important national problem—the continuation of the nation.

It is said that high infant death rate is one of Nature's measures to check over-population and carry out her law of 'survival of the fittest'. But the fall in birth rate will become a problem before long, especially in the better portion of the race. Also, we need not try to decrease the population in this most uncivilized and unscientific way; because the Public Health Commissioner for India in his report (Russell, 1938) writes 'The resources of this country are therefore immense, but they will become available for the betterment of the people only by a well-planned campaign of economic development'. So we need not lose heart at the increase of population. We want people. We want them to be strong to raise our economic state. The other criticism that it will allow only more weaklings to live is not true, as proved by an investigation done in England by Dr. Ballard (McCleary, 1933) during the diarrhoea epidemics. In this connection he writes 'Our experience of these two epidemics, then, by no means supports an opinion commonly held that a summer diarrhoea epidemic makes its first fatal swoop upon the weakest children. Like a good many other beliefs, it will not bear the test of experience. The evidence indeed tends the other way, namely, that weakly children require a longer exposure to the epidemic cause, whatever that may be, than hearty children'. Furthermore maternity and child welfare loses its value if it allows weaklings to remain so. They can be made strong if they are properly looked after.

In considering the infant mortality and in our attempt to reduce it, we have to bear in mind that the infant life does not begin after it becomes an extra-uterine subject. As Frew (1936) says, the infant has already had '280 days of individual existence; 7 months as foetus, 7 weeks as an embryo and 7 days as an impregnated ovum, and before that still, is a prolonged but varied existence in the germinal cells of the parents'. Then it has gone through a crisis in its attempt at seeking independence from its mother. Soon after this it is suddenly brought into a new atmosphere. The infant period of an individual is different from any other period of its life. Its environments are changing, its internal organs are actively destroying things which are not needed for life and health, and building up things which will help its growth. At this period of very active growth, when it doubles its weight within six months, which it can never do in any other period of its

*Read at the meeting of the Public Health Society, Calcutta, on the 23rd December, 1938.

life, it has great capacity to recover from disease. At the same time if the disease is allowed to take the upper hand, it can do more harm and disablement than it can do in a grown-up individual. The problem of infant mortality can never be dissociated from the problem of infant morbidity. The same causes which kill some, may maim others. These maimed infants may grow up to adult age being handicapped in various ways in their discharge of duties to the state. They, therefore, grow up to be completely or partially crippled with no or diminished productive power. It is obvious enough that the state does not get what it would have got if they were healthy. This loss was really one of the causes which made the authorities in England realize the necessity for better care of infants and toddlers. It was during the last war, when they wanted to recruit young men for the army, they found that a very large number were not fit because of some disease during infancy or childhood. These diseases left their mark, made them undergrade, though they had not killed them. So we should never let any disease thrive in the infants and Nature is there to render special help in our attempt to cure them.

It is self-evident that to initiate a thorough campaign the causes of death must be ascertained. Though poverty, ignorance, prejudice and social customs play a great part in the high mortality of infants, they are not the only factors. The causes given in the reports of health officers are very unsatisfactory as the deaths are not certified by medical men. Even in some hospitals the causes of death are not scrutinized. I have analysed the records of 216 infants who died in half Ward 8 since 1933. These records are not satisfactory as we had to depend on the health visitor to diagnose the cause of death, and she in her turn had to depend on the relatives. Again, I shall be able mostly to discuss the postnatal causes as I have only a few neonatal cases. This is due to delayed registration and therefore the health visitors could not come in touch with all the infants during the early period of their lives. England achieves this object by compulsory notification of births within 36 hours of delivery. Thus the health visitors get chances to see the infants who survive the first day. Even hospitals cannot help us, as mothers usually are not kept longer than 10 days. Better light may be thrown on this aspect if I bring to your notice that in 1936, in spite of our efforts, out of the 85 infant deaths in our area only 52 were entered on cards. The births of the remaining 33 were not registered, and therefore were not on record in our centre. Most of these might have died in the neonatal period.

In this investigation the causes of death have been divided according to the two age periods—neonatal and postnatal. Neonatal is one month from the date of the birth. The other 11 months belong to the postnatal period. This

classification has been made as the number and the causes of death differ very much in these two age periods. Antenatal and intranatal deaths in the form of miscarriages and stillbirths are not discussed here. Among the 216 infant deaths that are analysed 49 = 23 per cent are neonatal deaths. The Health Officer of Calcutta (Biswas, 1935) says that 42 per cent of the infant deaths occur in the neonatal period. The Public Health Commissioner for India gives it as 60 per cent in 1936.

Causes of neonatal deaths

Prematurity.—Neonatal deaths, the majority of which are due to prematurity, are more obscure and hard to control than postnatal deaths. England, in spite of her thorough welfare work, could only bring down her neonatal deaths from 40.7 per 1,000 to 30.4 per thousand during the years 1907 to 1935. But she has in the same period succeeded in bringing the postnatal deaths from 32.4 per thousand to 9.7 per thousand. In a series of post-mortem examinations done by Dr. Bundesen and others (1938) on 911 infants, in 362 no ascertainable cause could be detected. Again, they found that out of 600 premature infants, in 320 no cause could be found, while among the 311 full-term infants, only in 42 no cause could be detected. As the causal factor cannot be detected always it is probable that infant mortality will have its 'irreducible minimum'. In this series of 49 neonatal deaths 20 were recorded as premature or unknown, while only in 8 cases among the remaining 167 postnatal deaths no cause could be ascertained. Also amongst the total of 26 prematures, in 15 cases no definite cause was found, while among the 190 full-term infants, in only 13 no cause could be determined. Among the 26 prematures in this analysis 10 died in the neonatal period. So, it shows that *prematurity* is one of the most important causes of neonatal death, and it is difficult to diagnose the cause in these premature cases. They are more susceptible to infection and injuries. The Health Officer of Calcutta (Biswas, 1935) records 1,103 as premature infants among the 2,723 of the neonatal deaths. Cruickshank by his post-mortem examinations done on 800 infants finds, that 50 per cent are due to prematurity and with some 'ascertainable cause' in the mother. Balfour (1930) in her investigation in Bombay city on prematurely born infants and those of weight below 4 lb. finds that 840 out of every 1,000 die within 3 months of birth. Balfour and Talpade (1932) say that the high infant mortality in India is to a certain extent due to high premature deaths. She attributes this to the defective diet of the mother, especially in vitamin B. She suggests that the less nutritious diet in South India may be responsible for the higher premature birth rate in that part of the country than in Punjab. She says that though the general belief is that frequent births are

causes of prematurity, she finds by an investigation done in Bombay that nearly 61 per cent are in women who are either pregnant for the first or second time. The effects on the infant because of its antenatal and intranatal conditions continue to act for some time after birth. Thus the mothers' health during pregnancy is a factor in infant mortality.

Infection.—The next important cause of death is infection. This is more important in India than in most other countries: because of the dirty habits of the *dai*. The mother escapes a fatal infection because, quite often, if the labour is normal the *dai* is called in just to cut the cord. The social customs of considering the mother and infant as something untouchable has to be blamed here along with the public authorities who do not take action against the *dai*. The *dai* cuts the cord with anything that she can lay her hand upon. The deaths due to sepsis and tetanus will continue so long we have this dirty, ignorant *dai* in our midst. In Calcutta among the 6,644 infant deaths in 1934, 440 or 7 per cent were due to tetanus neonatorum. In 1935, out of 6,061, 337 or 6 per cent were said to be due to this cause. Out of these, 220 died within one month of birth. The number that died from umbilical sepsis is not given. But it cannot be less as I found that 5 infants died of tetanus while 6 died from other umbilical infection out of the 49 neonatal deaths in our area. The Health Officer (Biswas, 1935) writes 'Tetanus neonatorum which is an entirely preventable disease is due to dirty midwifery. It is almost unknown among the thousands of cases attended by the Corporation nurses'. We know that it is entirely preventable.

Gastro-intestinal infection which is often due to ignorance of the relatives and artificial feeding is another cause of neonatal death. Out of the 49 cases 10, i.e., 20 per cent, were due to diarrhoea.

Birth injury.—This is the other main cause of death. A large number of both premature and full-term infants die from this cause. Mitra (1934) shows that among full-term infants 3.8 per cent of the abnormal and 1.4 per cent of the normal labours, die within a week. This high death rate in abnormal cases might be due to injuries. With proper antenatal care this can be prevented. Bundesen and others (1938) in Chicago found by autopsy that in 962 deaths 237 were due to this cause. In this investigation out of the 44 cases that died with complication of pregnancy 18.6 per cent were due to intracranial hæmorrhage. Of 67 cases of complication of labour 28.3 per cent were due to hæmorrhage. Of the 88 cases of operative intervention 37.1 per cent were due to the same cause. And in 23 with complications of pregnancy and labour 9.7 per cent were due to hæmorrhage. Then there are other injuries such as injury to the nerves, bones, etc. There

were 2 deaths from convulsions in the present series which might have been due to injury.

Causes of postnatal death

In the postnatal causes environment and efficiency of the mother to bring up children play an important part and the cause of these deaths can be ascertained to a great extent. In this series the causes were known in most of the cases and 85 per cent of these could have been prevented if early steps were taken.

Environment.—Basak (1938) in Bombay city found infant mortality to be closely associated with overcrowding. In London in the Ministry of Health investigation, Campbell (1929) says that infants dying from postnatal causes (gastro-enteritis and respiratory diseases) come on an average from the more crowded parts of the district. The mean rooms per person for gastro-enteritis was 0.593, for bronchitis and pneumonia was 0.625, whereas census figures for the four districts combined was 1.104 room per person. Regarding the economic condition, Woodbury (1923) finds, in 20,000 children in American cities, a relationship existing between poverty and infant mortality, as measured by the father's income. But in the Ministry of Health's report in London no such direct relationship could be obtained. There they have found that the upper classes, as for example professional and upper middle class, and the lowest class of unskilled labour have the highest mortality, whereas the intermediate, for example the skilled labour, have the lowest.

Pneumonia.—In the present series pneumonia took the greatest toll, i.e., 65 out of 216, = 30 per cent, of the total deaths. The incidence was greater, during the first 6 months it was 59 per cent. It affected the weaklings and the healthy infants equally. In certain months of the year the incidence was higher. Between April and October 80 per cent of deaths occurred. It is significant to hear from our health visitor that she almost 'Closes the death register during the winter months'. Pneumonia is less, diarrhoea is less and also the deaths due to small-pox are almost nil. Pneumonia is said to be favoured by overcrowding and low standard of living. One cannot be surprised at the number of pneumonia deaths if one sees the condition of the poor women both in *bustees* and dark, small, congested rooms of the *pucca* houses. Among my cases 201 children lived in one-room tenements with an average of 4.8 persons per room, ranging from 2 to 11 per room and 15 were living in two-room tenements. I could not find any greater increase of the incidence of pneumonia in overcrowded places than for any other disease. It may be that the rooms were too congested to make this fine differentiation, because at times 4.8 persons live in a room 5 by 6 feet. Also these mothers, in addition to the all-prevailing poverty, are very ignorant. But I will be giving a wrong idea if you think that pneumonia is prevalent only in poor houses. It is quite common in well-to-do houses, where it

is nourished by the habit of closing the doors and windows, thus making the room ill-ventilated. Often we have to criticize the mothers at the centre about the dress of their infants. There is no doubt that the mothers, especially in places with great variation of temperature during different periods of the year, need a lot of training about clothing of infants, if we want to reduce the deaths from pneumonia.

Among the total deaths that occurred from pneumonia it was found that in 25 cases mothers were ignorant and did not realize the seriousness of the predisposing causes. Rickets had been present in 6 and bronchitis had occurred in some cases once or twice before. Sixty-three of these children were normal at birth, and when it is seen that other countries can reduce the deaths due to these causes, we too should be able to do it.

In referring to pneumonia I would like to mention how often we find anæmic children with a 'weak chest'. They get bronchitis easily and we often find them with excessive mucus in the throat. These children seem to be most prone to any infection, both on account of their general condition and this excessive secretion of mucus. They react well to the administration of iron. The wheezing and œdema vanishes and the child improves in colour and vitality.

Diarrhœa.—This is the next most important cause and accounted for 26 per cent of the deaths in my series. Countries like New Zealand have shown us how entirely preventable this disease is. Out of the infant mortality rate of 32 in New Zealand, only 1.7 is due to diarrhœa. So why can't we prevent it also? This problem is becoming more and more important at the present time. Indian mothers till recently thought that breast milk is an infant's birthright and suckling is a sacred duty. That was good. But as this consciousness in mothers is decreasing because of the so-called modern ideas, the deaths due to diarrhœa will increase. In our welfare centres it is not rare to hear mothers saying that they cannot suckle their infants, there is no milk in their breasts, and so on. Often the medical profession is to blame. If a woman loses one or two children from any cause, it may be even from smallpox, the neighbours and even doctors sometimes tell her that her breast milk is not good. We all know how much effect psychological influences have on the flow of breast milk. So naturally the mother does not make an attempt to feed the child and she takes shelter under the doctor's opinion. There are still a few mothers who are very anxious to feed their babies. I hope we will be able by welfare work to save the mothers from falling a prey to the belief, that tinned milk is superior to breast milk.

Diarrhœa is often associated with artificial feeding of one sort or another. Western countries realized it many decades ago. They inquired into this cause and the first movement

in America was to establish milk depots where clean milk was given only to the needy infant, when they have made themselves certain that the mother could not feed it. They encouraged breast feeding by giving small presents to mothers. But it looks as if we are going downwards in civilization in the matter of this important subject. We all know that colostrum is the most digestible food and nature made it ready for the small delicate stomach of the infant. Cadogan (McCleary, 1933) said as early as 1748 'If we follow nature, instead of leading or driving it we cannot err . . . when a child is born there seems to be no provision at all made for it, for mother's milk seldom comes till the third day, so that according to nature, a child would be left a day and a half or two days without any food, to me a very sufficient proof that it wants none'. But in the tropical climate it will not be wrong to give some water. But what do we give? We often see cow's milk forced on the poor infant though it tries to show by vomiting, that it is not wanted. Sometimes ghee is put into its mouth, thus starting the life in a wrong way. It is often given with some dirty piece of cloth. To satisfy the relatives, even in our welfare centres we have to resort to sugar and water. It would be interesting if we could compare two sets of infants one with plain water and another with sugar and water during the first three days, as to loss of weight in the first week.

The relation of diarrhœa to artificial feeding is very significant in my series of cases. Among the 216 cases 116 were breast fed. Of these 15, = 13 per cent, developed diarrhœa. Breast and artificially fed were 73. Of these 26, = 34 per cent, developed diarrhœa. Only artificially fed were 27. Of these 16, = 60 per cent, got diarrhœa. The above figures tell their tale clearly. But this result may not be due to artificial feeding only. I believe external infection plays a great rôle too. The dirty bottles and the open milk jugs lying in an artificially fed infants' room, not to speak of the milk diluted with dirty water, and in an open can with some straw in it which is carried and supplied to the houses are certainly also responsible. Because of the poverty and ignorance about hygienic habits we should be all the more anxious to advocate breast feeding. The disadvantages of artificial feeding are many and quite a number of the infants die either from diarrhœa or starvation. This could have been prevented if the mother took the trouble to give her child what is its 'birthright'. Many mothers have neither the means nor the help and intelligence that are needed in artificially feeding a child. I am sorry to say that our medical colleges must be blamed in a number of instances. At the centres we often meet infants who are put on tinned milk, and then kept on barley water for many days, just because the child got diarrhœa when the mother was feeding it on the breast. Thus at a time when the

stomach cannot tolerate even the normal food some foreign matter is forced on it. So we can guess the result. People put the notion into the mother's head that her milk is unsuitable, though she has successfully brought up many children on a similar kind of milk. The children are often dehydrated and sometimes we have to keep them under our care for days together in our centre and teach the mother the proper kind of feeding. But often it is difficult to dislodge the belief she has on the words of her family doctor who had been treating all the diseases in her family and whom she meets often. Such practitioners should realize their responsibility and must give proper instruction. It is not rare to see infants being completely stopped breast feeding just because the mother had diarrhoea or slight fever for a day or two. I think, if she is not too ill, it will be better for her to feed and relieve her distended breast, and save her child too.

Among the 159 which died from other causes only 58 had some sort of artificial feeding. So it is seen that death due to diarrhoea is much more frequent in artificially fed children, and specially among those who are fed before the first month of life. However much is said that the breast milk yield of Indian mothers is unsatisfactory, we cannot advocate artificial feeding when we know these dangers.

Diarrhoea is most prevalent during summer—April to August. Thirty-five deaths having occurred out of the 56, = 64 per cent, and 21 only during the other 7 months. Also 41, = 77 per cent, of deaths were between the ages of 1 to 6 months, while 15 occurred during the other 6 months. It is, therefore, likely that artificial feeding during these earlier months is definitely harmful to the infant. If so many infants had died during the summer months in other countries it would have been called an epidemic and money and energy would not have been spared to investigate it. In New Zealand the proportion due to diarrhoea and other causes is about 1 to 20. When it becomes a little more they get alarmed. But here the proportion between diarrhoea and other causes is nearly 1 to 4 and it is classed as endemic. No measures are taken to find the causes and to prevent it. The only means that is within easy reach of the welfare workers is to avoid artificial feeding which we think is certainly one of the most important contributory causes of this disease, though some sort of organism is the activating cause. I could not find any relation between diarrhoea and customs and habits of people of different religions.

Starvation.—Another great defect of artificial feeding is the deaths due to starvation. In fact, out of 216 deaths, in 14 cases we could definitely find that they were due to neglect and starvation, and they were all artificially fed babies. Ignorance, poverty and poor health prevents the mother from giving enough food

and care to her children. I am sorry to say that among all deaths this cause comes third in the series. This will make me discourage artificial feeding more than any other cause. When the child is brought to us completely starved and emaciated, and we give a little milk or water and see the greed with which the infant drinks it, the sight is too pathetic for words.

Smallpox proved fatal in 11 cases. None of the children were vaccinated in time. Here, though the parents are to be blamed to a great extent, as they were visited often and advised vaccination by our health visitor, the health authorities are responsible to a certain extent too. It is to the doctors here who will be going as health officers I appeal, that one of their duties should be to remove the notion that vaccination before the sixth month is harmful. First of all they should tell this to their vaccinators who often send back our welfare centre infants if they go for vaccination before 6 months. In Lady Hardinge Hospital, Delhi, I used to vaccinate the infants before they left the maternity ward and among the few children I saw in the postnatal clinic no harm due to vaccination had occurred. So, I think, these preventable deaths would not have occurred if the infants were vaccinated.

Nine deaths were due to sepsis—boils and other infections. Three infants died of convulsions and this might be due to birth injuries or some other condition. No definite cause could be found.

There were 3 cases of tuberculosis. Lung tuberculosis is said to be rare among infants. The mothers of these infants had active tuberculosis. One infant had definite signs in the lung, the others most probably were meningeal.

Three deaths were due to anaemia. Congenital syphilis was the cause of one death and diphtheria of another.

Age incidence of important postnatal causes

Bose (1913) says that diarrhoea and enteritis show little difference between the first and second quarter, or the first three months of life considered singly. Deaths from bronchitis and pneumonia are heavier in the first month than the second and third and are the highest at the first quarter. I did not find this to be true as pneumonia was highest (i.e., 37 per cent) at the second quarter, and enteritis (60 per cent of the total) during the first four months.

Prevention.—Western countries realized the value of prevention and the public health measures increased. Though there was a fall in general death rate due to these measures, the death rate in infancy remained stationary. Side by side the birth rate was falling. This made them take more active steps against the wastage of infant lives. England had a children's hospital as early as 1739. Different countries took different measures but the first active beginning

was in the form of milk depots where good, clean milk was supplied free or at a low price, to needy infants and mothers. Also the relation between the environment, mothers' efficiency and mothers' health, and infant mortality was realized, and measures were taken to improve them. Some voluntary workers in Manchester began their health visiting as early as 1860. They knew that mothercraft like any other crafts, had to be taught. France took a leading step and called the first international congress on infant welfare in 1905 in Paris. Then Britain called the first national congress on infant mortality in 1906. Even before this people had realized that infant welfare by itself cannot be a success unless it is combined with maternal welfare. Workers had realized that nearly one-sixth of the infant deaths occur before one week and thus before they could give any help in the form of advice to the mother. Dr. Ballantyne's 'Manual of Antenatal Pathology and Hygiene' was of great help in advancing the infant welfare movement. It was realized that the infant had to be looked after even before it is born and also at the time of birth. Thus the antenatal and intranatal care started. Budin started infant welfare in the last decade of the nineteenth century and had a consultation clinic for antenatal mothers. In 1876 antenatal care was started in the form of a home for pregnant mothers who needed care before delivery. Also in 1844 the first crèche was established by Firmin for the children of married women working in factories. As early as 1882 the definite cause of infant deaths in epidemics was inquired into and there was an investigation and enquiry into epidemic diarrhoea. An infant mortality investigation was carried out by the League of Nations in 1929. Thus in various ways attempts were made to bring down the mortality of infants.

At the same time legislation was enacted which enhanced the facilities of the workers. The 'Notification of Births Act' was passed at different local areas in Britain as early as 1906. It was made compulsory over the whole country in 1915. Also the acts to protect infants in industrial and other occupations, and from cruelty were passed. The 'Midwives Act' facilitated the intranatal work. Thus matters were advanced rapidly in protecting the mothers and children by establishing antenatal clinics, giving good midwifery service, and then by the expert postnatal care to the mother and child. The child is followed up carefully and its health is looked after from the antenatal period up to school age. Then well-organized school medical inspection gave individual care to every child. After school age it is protected by insurance.

When can we hope for such a day and such a protection to each and every one of our countrymen and women? The most important thing we need at present is compulsory legislation and then only welfare work can advance. The public

is becoming conscious of the wilful waste and needless suffering of which ignorance is the chief cause. So it is not too early to bring in compulsory legislation. I heard in Lucknow that people are fined if the health authorities discover that any parent had neglected to register the birth of a child. Why does not Calcutta follow this example? In India we have to fight against many odds. Poverty and ignorance added to our unwholesome age-long customs and beliefs make many things difficult for us. But by perseverance we should win. Other countries were ignorant like us at some time in their history. In 1748 in England Cadogan writes 'The general practice is, as soon as a child is born, to cram a dab of butter and sugar down its throat, a little oil, or some such unwholesome mess. So that they set out wrong, and the child stands a fair chance of being made sick from the first hour. It is the custom of some to give a little roasted pig to an infant; which it seems, will cure it of all the mother's longings. I wish these matters were a little more enquired into for the honour of sex'. When I read this I felt quite hopeful. Some day we will be able to fight against the existing ignorance which is partially due to want of education.

Especially for India with her innumerable diseases, which cause both maternal and infant deaths, we need good antenatal care. Pregnancy anaemia which is peculiar to our country and is responsible for 23 per cent of the maternal deaths, is a cause of infant death too, so I am glad we are enquiring into its etiology and the measures for prevention. A tropical climate by itself was found not to increase the infant mortality in an investigation done in Australia, comparing the tropical and non-tropical parts of Queensland. It was 58.98 and 58.6 respectively. In Calcutta, where pregnancy anaemia is so common, and where there are so many other diseases like toxæmias which carry away many mothers, there are no antenatal beds reserved for these cases in hospitals. Welfare workers are often handicapped because of this.

Having given a chance to the mother to carry her pregnancy to full term by well-established antenatal care we can prevent many premature deaths. Then we have to see to the intranatal care. Until some legislation is passed to check the field of activity of the *dai*, it is difficult to produce marked improvement in infant mortality. The Health Officer of Calcutta (Biswas, 1935) realized that there was hardly any infant death due to tetanus among the deliveries carried by the Corporation midwives. Still was anything done to prevent the harmful work of the *dai*? I am sorry to say that the midwives supplied by the Corporation are too few in number. I was told that in an area where there are nearly 550 births in a year only one midwife is posted. How can she give time to such a large number? We cannot advise the mothers to call a Corporation midwife because they often tell us they

cannot get her at the time of need as she has too many cases to attend. We cannot send them to hospital, because the beds are too few. Only recently we had three mothers who were sent to the hospital and as no bed was available they had to hurry back home for delivery with no help and nothing prepared. It is a great problem for the welfare workers, where to send the mothers who need hospital care.

With regard to infants, when they are sick there is hardly any place to recommend them to be taken. There are only a few beds in different hospitals and rarely they are vacant. There is no convenient out-door clinic for children only, where they can get expert advice. This is another problem when we want hospital treatment for children. If it is only malnutrition due to defective feeding we keep them in our clinic in the observation beds and treat them. The rest are often left to private practitioners who, generally, have little knowledge of children's sickness and children's wants.

Lastly I would like to mention some causes which are prejudicial to good health, viz, ignorance, social customs and superstitions. Most of the mothers do not like to give up the habits they are used to. They are not sufficiently educated to be able to reason. The old mother-in-law at home or the grandmother seconds her in her wrong doing. They refuse to put in practice even regular feeding, which saves a lot of mother's time and energy and gives good habits to the infant if started from the beginning: because none in the family were reared in that way. Any cry of the child is thought to be due to hunger.

The idea that a pregnant mother should not go out much is common and harmful. A woman after delivery is made an outcast for days, varying between 10 to 40. Naturally she and her infant are kept in an unhealthy corner in the house. Only education can decrease these age-long ill practices.

Among social customs *purdah* is responsible for many deaths in mothers and infants. Osteomalacia is more common among these women. This produces deformity resulting in ill health during pregnancy, difficult labour and disablement. On account of *purdah* fresh air and sunlight are denied to the women and their young children. We have already said how a congested atmosphere predisposes to postnatal causes of infant mortality. It is said that infant deaths are less in a rural than in an urban area. The Public Health Commissioner records it as 157 for rural and 211.6 for the urban areas for every 1,000 live births, in 1936. In England they found it less in cities and villages but more in towns. In cities it may be less due to well-organized maternity and child welfare and children's hospital. We should not be surprised at the increase in number in urban areas in India. The people of the cities are mostly those

who have come from villages. There, though they observe *purdah*, generally every house has a small back yard where the women can have fresh air. Children go about and have enough fresh vegetables and other fresh things to eat. When they come to a city, in addition to the polluted atmosphere, they are shut up in small rooms with no access to sunlight or air and take very unsatisfactory food.

Early marriage is another factor. Fortunately it is becoming less common. Out of 177 primiparas on cards in our welfare centre I found 4 were the age of 13—an age when the mother herself was not more than a child; 5 were of 14 years, 16 of 15 and 37 of 16 years of age. Thus 35 per cent were within the age of 16 years. It is likely that the children of these mothers may not be strong; this fact contributes another cause for the high infant morbidity and mortality rate. Also, such a young mother cannot be expected to realize her responsibility to her child and bring it up well or train it in the proper way.

Superstitions are many. Many diseases are thought to be due to some evil spirit and no attempt is made to cure it in any scientific way. Many refuse to get their infants vaccinated in spite of knowing the benefits.

I have already spoken about the want of proper legislation

Only propaganda, education of the masses and good organization of medical and preventive help, supported by adequate legislation, can bring our infant mortality down.

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Medical News

RESEARCH IN ANIMAL NUTRITION

A LANDMARK in the history of animal nutritional research work in India was reached on 11th March, when His Excellency the Viceroy opened the buildings which are to house two new sections of the Imperial Veterinary Research Institute at Izatnagar. These buildings comprise the Animal Nutrition and Poultry Research wings, as well as residential quarters for the staff. Other proposed constructions include a genetics institute.

Together with the biological products section, the new branches form a unit of noteworthy size and importance. The total cost of the new buildings is about Rs. 8,00,000.

The main functions of the institute will be the study of nutrition in relation to the health, normal growth and productive capacity of animals in India. An up-to-date building has been constructed at a cost of nearly Rs. 5 lacs and the recurring expenditure will be about Rs. 95,000 a year.

The poultry institute owes its origin to a recommendation of the Advisory Board of the Imperial Council of Agricultural Research which came to the conclusion, as a result of applications for grants from provinces, that the most effective and economical way would be the establishment of a central institute.

The work of the institute will be organized into two sections, one dealing with scientific subjects and the other with industrial processes.

On the scientific side the institute will deal with disease investigation and nutritional studies, and on the industrial side with such questions as the grading of eggs and their preservation, the preparation of table poultry and the best methods of packing and distribution of both eggs and poultry and the possibility of introducing such articles as egg powder and egg pulp to the Indian market.

The egg marketing survey showed that India has over 52,000,000 laying hens alone, that the eggs sold annually, apart from those used by villagers themselves, are worth over Rs. 5 crores annually, and that the value of hens is over Rs. 7 crores. The marketing survey further showed that there are profitable opportunities for expansion.

The institute itself has cost about Rs. 2½ lacs, and the recurring cost will be over Rs. 55,000 a year.

THE NUTRITIVE VALUE OF INDIAN FOODS

THOSE who want to plan diets either for themselves or for others will find their task made easy by the *Health Bulletin* on 'The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets', a second edition of which has just appeared.

It is advisable, says the *Bulletin*, that those who are responsible for the institutional care of children, etc., and all who are concerned with practical nutrition work, should have some idea of the effects on the body of a diet which is ill-balanced and defective... e.g., of a diet which is largely composed of milled cereals and contains an insufficiency of proteins, mineral salts and vitamins—and which calls for improvement. There is a long list of diseases, common in India, due in some way or other to dietetic causes. Such are: beri-beri, certain anemias of pregnancy, keratomalacia, osteomalacia. States of malnutrition which fall short of serious disease are widespread.

Protective foods

It is not only the poor, whose choice in the matter of food is extremely limited, who are ignorant and prejudiced about diet. Many people in India and elsewhere, who could afford to consume and feed their children on an excellent diet, do not in fact do so. One can readily find among children of the more

prosperous classes cases of serious malnutrition and food deficiency diseases.

3RD ALL-INDIA OBSTETRIC AND GYNÆCOLOGICAL CONGRESS

THE 3rd All-India Obstetric and Gynaecological Congress will be held in Calcutta in December 1939. The principal subjects of discussion are: (1) anamia of pregnancy; (2) functional uterine hæmorrhage, and (3) maternity and child welfare. The Provisional Scientific Committee have formulated a scheme to facilitate investigations on those subjects. The Secretary of the Provisional Scientific Committee will be at the service of any investigator to supply any relevant information. All communications about it are to be made to Dr. S. Mitra, M.A. (Cal.), M.D. (Berlin), F.R.C.S. (Edin.), F.R.C.O.G., Secretary, Provisional Scientific Committee, 3, Chowringhee Terrace, Calcutta.

TUBERCULOSIS NEWS FOR THE MONTH OF APRIL 1939

TUBERCULOSIS ASSOCIATION OF INDIA

1. THE Inaugural General Meeting of the Tuberculosis Association of India was held at the Viceroy's House at 5-30 p.m. on the 29th March, 1939. Her Excellency the Marchioness of Linlithgow, the President of the Association, occupied the chair. The meeting was attended by the foundation members, ex-officio members and representatives of all the provinces and important Indian states. Her Excellency in delivering her inaugural address explained that the most important result of her appeal for the King-Emperor's Anti-Tuberculosis Fund was the permanent establishment of provincial and state tuberculosis associations on a permanent footing and hoped that the rules and regulations will once for all lay the bogey of interference or control from the centre and said that co-ordination and good fellowship will be the watchwords of the Central Association. Her Excellency's address was followed by a business statement by General Bradfield, the Chairman of the Central Committee. He explained in some detail the policy to be followed by the centre, which by expert advice, propaganda and research is designed to stimulate interest not only of affiliated bodies but of all authorities whether Government, municipal or private. The association will seek co-operation of all agencies promoting public welfare and will try to retain in some way the connection with the Red Cross, which has been valuable in the past. The Honorary Treasurer then explained the financial position of the association, which at present with the central share from the King-Emperor's Anti-Tuberculosis Fund and the capital and balances of the King George Thanksgiving Fund amounts to Rs. 16,97,019 giving approximate annual income of Rs. 65,100. Representatives as provided for in the rules were elected to the central committee which has now representatives of various interests in the country.

The first meeting of the central committee was held at 10 a.m. on the 30th March, 1939, at the Viceroy's House under the Chairmanship of Her Excellency the Marchioness of Linlithgow.

The committee disposed of a long business agenda, and by a unanimous vote appointed Dr. C. Frimodt-Møller as Medical Commissioner for two years. Dr. Frimodt-Møller has been connected with the Madanapalle Sanatorium for a number of years and is an expert of international fame in the field of tuberculosis. Her Excellency expressed gratification at the appointment and said that she had great admiration for Dr. Frimodt-Møller's work and that to her knowledge, his work is appreciated by everybody in this country, with whom she had occasion to talk about him.

2. The 25th Annual Conference of the National Association for the Prevention of Tuberculosis, London, will be held in the College of Technology, Belfast, on the 29th and 30th June and 1st July, 1939.

ANNOUNCEMENT OF THE FRANCIS AMORY SEPTENNIAL PRIZE OF THE AMERICAN ACADEMY OF ARTS AND SCIENCES UNDER THE WILL OF FRANCIS AMORY

In compliance with the requirements of a gift under the will of the late Francis Amory of Beverly, Massachusetts, the American Academy of Arts and Sciences announces the offer of a septennial prize for outstanding work with reference to the alleviation or cure of diseases affecting the human genital organs, to be known as the Francis Amory Septennial Prize. The gift provides a fund, the income of which may be awarded for conspicuously meritorious contributions to the field of knowledge 'during the said septennial period next preceding any award thereof, through experiment, study or otherwise . . . in the diseases of the human sexual generative organs in general'. The

prize may be awarded to any individual or individuals for work of 'extraordinary or exceptional merit' in this field.

In case there is work of a quality to warrant it, the first award will be made in 1940. The total amount of the award will exceed ten thousand dollars, and may be given in one or more awards. It rests solely within the discretion of the Academy whether an award shall be made at the end of any given seven-year period, and also whether on any occasion the prize shall be awarded to more than a single individual.

While there will be no formal nominations, and no formal essays or treatises will be required, the committee invites suggestions, which should be made to the Amory Fund Committee, care of the American Academy of Arts and Sciences, 28, Newbury Street, Boston, Massachusetts, U. S. A.

Current Topics

Treatment of Pain : Conferences on Therapy

(From the *Journal of the American Medical Association*, Vol. III, 17th December, 1938, p. 2293)

DR. HARRY GOLD: The symptom pain stands high, if it does not actually lead, in the list of causes of disability. It is probably the most frequent symptom requiring attention in the practice of medicine. If one were to survey a fair sample of the results generally obtained with drugs for the treatment of pain, one would discover that they are not as good as they might be. The outstanding deficiencies fall into two classes:

First, one finds a considerable proportion of failures to abolish the pain. The primary objective seems often not to be attained.

Second, in a fair proportion of cases, whether the pain is controlled or not, other effects, disagreeable and sometimes disastrous, result: nausea, vomiting, constipation, distension, urinary retention, temporary blindness, deafness, skin eruptions, profuse perspiration, stupor, methemoglobinemia, agranulocytosis, acute yellow atrophy of the liver, and narcotic addiction. This is but a partial list of one that could be very much more formidable, representing the untoward reactions that follow the use of agents employed for the relief of pain.

All of this indicates that there are no ideal pain-relieving substances; our task is to consider what we need to do in order to make the drugs or medicinal agents at our disposal as effective and as safe as possible in the control of pain.

Every case of pain presents a problem. The use of drugs to control pain involves a judgment which grows out of the careful appraisal of many facts. There is a prevailing tendency in a case with pain to dig down into our bag of analgesics, fetch up something that is supposed to kill pain, and prescribe. If we do that, the range of successful treatment becomes relatively small indeed, and alongside of the little good that we do, in that way, there stands enough harm to eclipse it. Illustrations of these remarks will appear in matters that will be discussed presently.

What are the matters one needs to consider as a basis for the use of drugs in the treatment of pain, in a manner likely to yield the greatest returns with the least risk?

1. Pain is a symptom and not a disease. In our zeal to relieve it, or in our success in relieving it, there is always the danger of overlooking the less obvious and less dramatic aspect of the case, the disease itself. Recently I encountered the case of a nurse who had suffered attacks of thoracic pain. With the approval of the house officer she took large doses of an analgesic agent and obtained relief. The last attack did not respond as effectively as the previous ones, whereupon

a careful examination was made. The results showed that she had been carrying on her nursing work with a pleural effusion and active pulmonary tuberculosis. This is the sort of thing one occasionally encounters. We must bear this fact in mind constantly, that pain is a symptom and not a disease, if the relief of pain is not from time to time to prove to be a misfortune.

2. Pain labels a disease and its location. This is another fact of some importance and is closely related to the statement previously made. You have all probably heard about cases, or perhaps you know of some from your own experience, of peritonitis directly attributable to the overzealous relief of abdominal pain before a definite diagnosis has been made.

3. The cause of pain is important to determine. We all know that it is necessary to ascertain whether the cause of a headache is a brain tumour or some insignificant functional disturbance so that the cause (the tumour) may be removed. But I have in mind something less than that. From the standpoint of relief alone without removal of cause, a clear appreciation of the cause is often very helpful. For example, of three kinds of pain in the chest, the pain of intercostal neuralgia, the pain of effort angina and the pain of coronary thrombosis, differentiation is sometimes extraordinarily difficult. The agents which relieve one may be ineffective in the other. One can group other types of pain in that way; for example, pain in the legs due to myositis, vitamin-B₁ deficiency or vascular disease. The effectiveness of the relief of the pain aside from the question of removing the cause depends here on a differential diagnosis.

4. The pathogenesis of pain is a matter of some importance; whether, for example, the pain is caused by spasm of smooth muscle or anoxemia or comes about as the result of inflammatory reactions around nerve fibres or endings.

5. The severity of the pain ought to be considered. Perhaps it is not sufficiently severe to require relief by therapeutic agents. Not infrequently when you are about to prescribe for a patient with pain the patient will ask you what the medicine is for, and you will say 'For your pain'. He may reply 'I don't like medicines. I am not much interested in the relief of the pain so long as my mind is relieved that the cause is not serious'. Before we prescribe a drug, the question should be put whether the relief will recompense the patient for other forms of discomfort which the drug may cause. You will see patients taking two or three doses of codeine a day for the relief of very mild aginal pains. The price is disagreeable stupor and troublesome constipation. Such pains can often be much better controlled if we take the trouble to assist patients in making the necessary adjustments to reduce their activities to a level within their capacity without pain.

6. The natural course of the pain is also significant: Is it going to last a few hours or several days? Is it going to recur over long periods of time? Is it the kind of pain the intensity of which is likely to fall from its peak very gradually or is it likely to subside very abruptly? Morphine poisoning often arises from the use of large doses of the drug in patients in whom severe pain subsides abruptly. In such a case the morphine may seem to be producing very little depression, and the doses are repeated to secure more relief of the pain. With little warning, however, you find the patient lapsing into a state of profound stupor with depressed respiration, and you wonder what has happened. You have used large doses of morphine in a variety of pain which tends spontaneously to come to an end rather abruptly, leaving the patient under the influence of an amount of morphine which is toxic in the absence of pain, for pain is an antidote to morphine!

The more common analgesic agents

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|--------------------------|---------------------------|
| A. Raise thresholds | 5. Salicylates |
| 1. Opium group: | 6. Magnesium sulfate |
| Morphine | 7. Sedatives |
| Codeine | B. Relax smooth muscle |
| Dilaudid | 1. Nitrites |
| Pantopon | 2. Xanthines |
| 2. Coal tar derivatives: | 3. Atropine |
| Acetanilid | 4. Papaverine |
| Acetophenetidin | 5. Calcium |
| 3. Pyrazolon compounds: | C. Special mechanisms |
| Antipyrine | 1. Trichlorethylene |
| Aminopyrine | 2. Ergotamine |
| 4. Cinchonic acid group: | 3. Caffeine |
| Cinchophen | 4. Vitamin B ₁ |
| Neocinchophen | |

7. The psychic element in pain may vary anywhere from an insignificant rôle to the sole cause of the pain. That needs to be considered also from the standpoint of the kind of analgesic agents that are to be used. Fear and anxiety increase the perception of pain, and the use of small doses of sedatives greatly enhances the effectiveness of some of the analgesic agents. When reasonable procedures in a given case seem to be without influence on the pain, one might well ask whether the patient wants his pain relieved; the pain in this case may be one of the patient's most precious possessions. That needs to be considered before one goes on increasing the doses of drugs or shifting from one preparation to another in the endeavour to relieve it.

8. Finally, drugs are only adjuvants in the treatment of pain. Physical therapy, psychotherapy and specific cause treatment in the long run play the most important rôle in any programme in which pain is the centre of interest.

These are some of the important questions demanding consideration before one writes a single word of a prescription for the treatment of pain. We must not pretend, of course, that a clear-cut answer will be always forthcoming, but I feel sure that if we ask those questions often enough we shall obtain a sufficient number of answers to make this sort of procedure extremely profitable.

Here is a list of the more common analgesic classification of them. Perhaps this is as good as any, but you may think of a better one. The first group includes those agents which raise thresholds at the centres and block the perception of pain. The second includes those which relax smooth muscle and in that way abolish the impulses at their source. The third group includes substances which exert a specific action on certain kinds of pain: trichlorethylene, ergotamine, caffeine, vitamin B₁. In some of these the mechanism is quite well established, in the case of others our knowledge is imperfect.

The more common clinical varieties of pain which present special problems are (1) headache, (2) visceral pain, (3) cardiac pain, (4) neuralgia, (5) root pains, (6) chronic arthritis, (7) dysmenorrhoea, (8) labour pain. The list is not complete. We do not have the

time this morning to go into all of these matters. Dr. Wolff is going to discuss some of the types of pain, and if any one has any special interest in others a discussion may be provoked by asking questions.

Dr. Harold G. Wolff: I am going to discuss one type of pain, and that is headache; and just one variety of headache, namely migraine. I am selecting migraine to talk about for two reasons: 1. It is said to be the commonest clinical entity that civilized man happened to fall heir to. 2. I think that the management of migraine headache allows us to discuss the clinical approach to the problem of pain in general.

By migraine headache I mean the type of headache that is usually unilateral in onset, may become generalized, is associated with nausea and vomiting, sometimes with visual and other sensory disturbances, and usually occurs in families.

There are three ways of approaching this type of headache, as there are for other types of pain: first, by considering agents or procedures that act at the site of production of pain, for instance, ergotamine tartrate, ergonovine, ephedrine, benzedrine, epinephrine, resection of posterior pituitary, ice cap, surgical ligation, resection and mechanical pressure; second, agents or procedures that act by raising the threshold of pain as, for example, codeine, morphine, acetylsalicylic acid, aminopyrine, acetanilid, phenacetin, ice cap; third, agents or procedures that act by lowering the blood pressure as in the case of glyceryl trinitrate or acetylcholine. I will disregard this third classification and limit our discussion to the first two.

Migraine results from the distension of some of the cranial arteries, chiefly the branches of the external carotid artery.

We know from our studies in the laboratory that a generalized headache can be produced with histamine, but after resection of the first division of the fifth cranial nerve such a headache will not appear in the part of the patient's head innervated by this division of the fifth nerve. Thus for clinical purposes we may consider the chief afferent pathway for headache to be the first division of the fifth nerve.

The method of investigation was as follows: The patient with a headache is put on a stretcher in a darkened room and a tambour over his temporal artery on the affected side records the amplitude of pulsations of the arterial walls. Records are made on a moving film in a camera.

In a representative patient with a migraine headache, ergotamine tartrate was given intravenously, and in the course of the next ten minutes the pulsations of the branches of the external carotid as recorded from the temporal artery had been reduced by 50 per cent and the headache had disappeared.

In another patient who received ergotamine tartrate (0.5 mg. intravenously) it happened to take about forty minutes for the headache to disappear, but again a parallel between the decline in the amplitude of pulsations of the temporal artery and intensity of the headache was demonstrated. A photograph was taken of this patient during the period of his headache, showing the large temporal vessels, both arterial and venous, standing out, which was in striking contrast to the flattened appearance of these vessels in a photograph taken immediately after the ergotamine had had its effect.

Records of pulsation of the cerebrospinal fluid, which represents the activity of the major spinal and the intracranial vessels, show variations in the height of pulsation which do not appear to be correlated with the headache or the disappearance of the headache after administration of ergotamine tartrate. Similarly, we have been able to demonstrate no correlation between the pressure of the spinal fluid and the headache. Thus I think we are at the moment justified in saying we do not know what rôle the branches of the internal carotid artery play in migraine headache, but such evidence as we have indicate it is not too important a rôle.

Photographs were taken of the retinal vessels before and after the administration of ergotamine tartrate. Although the veins appear to be a little smaller, I

doubt whether there is much change in the arteries, although there may be a slight constriction.

Further, it can be demonstrated that ergotamine tartrate does not act in terminating headache by raising the threshold to pain. For instance, in one patient who had had his headache terminated by an intravenous dose of ergotamine tartrate an injection of 0.1 mg. of histamine produced the usual acute, the short-lived, histamine headache. This then indicates that the patient is just as able to perceive the headache after the administration of ergotamine as he was before.

In one patient the intramuscular injection of solution of posterior pituitary caused the headache to disappear, but the patient was white, was tremulous, complained of bad abdominal cramps and bad precordial pain, and I feared he might faint during the experiment. It is not a drug that one would care to give regularly, and it is not one that one can count on having a constant effect. It is not to be recommended.

Ephedrine sometimes succeeds in improving or eliminating a migraine headache, via the same mechanism: a reduction in the amplitude of pulsation of the cranial arteries. But the patient to whom it is given for migraine headache becomes tense and tremulous, and the disappearance of pain is often transient since at the end of four hours the headache may return with full intensity. Therefore, ephedrine cannot be considered as either a practical or a useful means of treating migraine headache.

In our experiments ergonovine, when successful, also eliminated headache by the same mechanism as did ergotamine tartrate. It contains more of the oxytocic property of the ergot drug, will abolish headaches in only about 50 per cent of trials, and cannot be relied on to be 100 per cent effective in reducing the amplitude of pulsations of cranial arteries.

Thus, if the agent employed succeeds in reducing the amplitude of pulsation of the cranial arteries by a sufficient amount, *i.e.*, from 40 to 50 per cent, headache will be completely abolished, as is the case with ergotamine tartrate. It is thus evident that ergonovine hydracrylate cannot be regarded as an important asset in the treatment of migraine headache. Benzedrine sulfate, caffeine with sodium benzoate and pitressin are likewise unreliable in their effect on the magnitude of cranial artery pulsations and consequently in their effect on the headache. For instance, in two patients, caffeine with sodium benzoate (0.5 mg. intravenously) happened to increase the amplitude of pulsations and made the headache worse. Ergotamine tartrate subsequently reduced the pulsations by 40 per cent and eliminated the headache. Similarly, benzedrine sulfate reduced the amplitude of pulsations in another patient 25 per cent without reducing the headache, whereas ergotamine tartrate subsequently administered terminated it, and the amplitude of pulsations was seen to be reduced by 50 per cent. Ergotamine tartrate may at the moment be regarded as the most effective agent we have in reducing the amplitude of pulsations of the cranial arteries and terminating the migraine headache attack.

Before ergotamine tartrate was available, codeine was the best agent for stopping headache. One grain, or 60 mg., of codeine will stop most headaches, but how does it work? We observed a patient with migraine headache to whom 60 mg. of codeine was administered subcutaneously. As the headache disappeared the amplitude of pulsation of the cranial arteries did not change at all, an illustration that codeine does not act on the local pain-producing mechanism but raises the threshold to pain impulses arising from the stretched and dilated cranial vessels.

Codeine administered to another patient abolished his headache, again with no change in the amplitude of cranial artery pulsations. This patient soon complained that his headache had returned with about 50 per cent of its original severity. We then gave him ergotamine tartrate, the headache disappeared promptly, and the cranial artery pulsations, although they had not changed during this whole period when the headache had been transiently relieved by codeine, were now reduced in

amplitude by over 50 per cent. His migraine attack proved to be successfully terminated.

How should one manage an acute migraine attack? The patient should retire to a darkened room and remain in bed for at least two hours, and 0.5 mg. of ergotamine tartrate should be given intramuscularly as soon as it is feasible to give the drug after the onset of the headache. This drug when given intravenously will produce quicker results; that is, it takes about thirty to fifty minutes to produce effects through the intramuscular route and about ten to forty minutes by the intravenous route. Giving ergotamine tartrate by the mouth should be avoided for two reasons: 1. It eliminates the headache only about 50 to 60 per cent of the time. 2. Patients may be induced to take it too often. Patients may have the tendency to take a few pills by mouth 'every once in a while'. If it is necessary to give it by mouth for reasons best known to you at the time, give 3 mg. followed by 2 mg. an hour until the headache has disappeared or a total of 11 mg. has been given. However, I am not enthusiastic about this procedure.

Suppose the patient feels as though he is about to have a migraine attack, is there anything you can do to stop it from developing? Usually not, but you might try. The patient can be urged to go to bed and 3 mg. of ergotamine tartrate may be placed under the tongue. This will be absorbed in a few minutes and sometimes will stop the headache when repeated in 2 mg. doses hourly until 11 mg. has been given. If it does not, you are in a dilemma because you have already given ergotamine tartrate and you do not know how much more to give by the more successful intramuscular or intravenous route. I am not in favour of ergotamine tartrate by mouth. Some report the successful use of a mixture of acetanilid and sodium amylal, although I never used it and I do not know how effective it is. In any event the patient should stay in bed for two hours after such medication. Many times patients feel they are going to get a headache and don't, so you never know whether this kind of procedure is efficient or not, but you can try it and see what happens.

Don't give ergotamine tartrate more often than once a week to patients with cardiovascular disease, with or without hypertension, including those with Raynaud's syndrome, venous thrombosis, syphilitic arteritis and coronary disease; to patients with sepsis or fever; to patients with hepatic or renal disease; to pregnant women. Fortunately, most pregnant women stop having migraine attacks during their pregnancy, and the occasional woman can take ergotamine late in the pregnancy without danger; but never give ergonovine hydracrylate under any circumstances to a pregnant woman. Lastly, do not give ergotamine tartrate to badly nourished or cachectic persons. It is said that persons deficient in vitamin C do badly with ergotamine, and a poorly nourished person probably has such a vitamin deficiency. Finally, remember that in treating migraine headache you are treating the acute episode of pain and not the syndrome of migraine.

Student: What is the length of time that a patient with migraine gets relief from one injection of ergotamine?

Dr. Wolff: It terminates the attack. Attacks usually last from a few hours to a few days. The administration of ergotamine does not shorten the interval between attacks. The management of the frequency of these various attacks must be through other means than ergotamine. Ergotamine simply terminates any given attack.

Student: I should like to know the mode of action and effectiveness of trichlorethylene.

Dr. Wolff: Trichlorethylene is useful in pains of the face of any kind. It is not known what the exact site of action is, but it seems to raise the threshold for all types of pain about the head. Its chief usefulness is in trigeminal neuralgia. I think that was discovered, as you probably know, during the war when it was used as a solvent for certain airplane coverings, and the workers in the airplane factories were being poisoned, so that they became anæsthetic about the face.

Student: Has it any effect on pains elsewhere?

Dr. Wolff: I do not believe so but I am not certain.

Dr. Cattell: In the past we have been fortunate in having the collaboration of representatives from various clinical departments in connection with our conferences. The list that was put on the board by Dr. Gold includes a number of conditions which might be discussed further. I wonder if there is any one here from the Department of Obstetrics and Gynecology who might be willing to say something about the topics dysmenorrhea and labour pain. The question of arthritis is another important topic.

Dr. Andrew A. Marchetti: I will talk about the first one. Dysmenorrhea is the pain in menstruation. As you know, dysmenorrhea is either congenital, functional or acquired. I think that of course the most important thing to do is to find out what can cause dysmenorrhea. Most of the time our therapy is pointed toward patients with dysmenorrhea who have either hypoplastic, that is, more or less infantile, generative organs or a malposition, acute anteversion and acute retroflexion. In those instances we give them so-called compound powders of atropine and codeine. Each powder contains 16 mg. of codeine sulfate and 0.25 mg. of atropine sulfate, as well as 160 mg. of acetylsalicylic acid and acetophenetidin. Patients are usually instructed to take the powders every four hours when they expect the pain, and usually two or three will relieve pains which are associated with the menstrual period. In instances we have used codeine, but as a rule that does not do as well as the compound powders of atropine. As Dr. Gold pointed out, the atropine is supposed to bring about relaxation of smooth muscle. It does help, especially in case of acute anteversion. It is not 100 per cent effective, of course, and it is less effective in the patient with a hypoplastic uterus.

Some of the nitrites have been used for dysmenorrhea, but I do not believe they are used as commonly as atropine and codeine.

In the acquired dysmenorrhea it may be a uterine or ovarian tumour, an inflammatory disease or a flare-up of salpingitis which causes the pain. Peritoneal or abdominal tumours that press on the uterus itself cause pain which is not elicited until the patient is about to have a period. A uterine or ovarian tumour may cause pain in the intermenstrual period.

Then too the cachectic or the undernourished person may complain of dysmenorrhea. You will find them anæmic, and when they are built up by good food, fresh air, and the things we commonly have at our disposal for nutritional disturbances, usually the pain at menstrual time disappears.

Are there any questions that you wish to ask?

Dr. Gold: I wonder how deep is the conviction with regard to atropine for easing menstrual pain. A quarter of a milligram is a mighty small dose, and I am not sure that with such a dose it will be ever possible to demonstrate any physiologic effect.

There is a question I should like to ask as to codeine.

Are you ever worried about the possibility of drug addiction since these patients take it repeatedly over long periods of time?

Dr. Marchetti: I have never seen that. I know Dr. Kelly in Baltimore is very apprehensive about drug addiction. I asked him about it and he said he had never seen it except on one or two occasions when patients became addicted to codeine. The drug is only a temporary measure. Usually, if the dysmenorrhea is severe enough, whether it is acquired, functional or congenital, the patient comes back. In the malpositions, let us say, we insert a pessary and give the patient a therapeutic test. If the retro position is relieved by putting the uterus in its normal position or approaching that, we then know the cause of the dysmenorrhea and eventually the patient will get a suspension.

Dr. Gold: I understand that aminopyrine is widely used in dysmenorrhea. Would you care to comment on this?

Dr. Marchetti: We discourage its use, particularly because of the danger of agranulocytosis. It does

relieve the pain but not as effectively as the compound powder of atropine and codeine.

Dr. Cattell: We have a small amount of time remaining for discussion, and there may be questions relating to some of the specific conditions mentioned. It seems to me this is an unusual opportunity to ask questions of men who have given special thought to the particular problems under discussion, and we should like to have all the students participate.

Student: I have heard of the use of benzyl benzoate in dysmenorrhea, and I was wondering whether there was anything to it.

Dr. Marchetti: It helps in some instances. I do not think it is as effective as the codeine and atropine.

Student: I should like to ask Dr. Gold how large a dose of morphine may be given to control pain in coronary thrombosis.

Dr. Gold: You cannot give more than a quarter of a grain of morphine ever entirely safely. One gives as high as three-quarters of a grain or even a grain, but if so one may expect to get into serious difficulties at times because coronary thrombosis is a classic illustration of very severe pain which tends to descend from its peak rather abruptly. If you give a quarter of a grain and the pain is not relieved, then within a half to three-quarters of an hour you give another quarter and another quarter; perhaps by the third or fourth dose the pain may subside rather abruptly and at the same time you have a patient in fairly deep narcosis, in whom the pain had previously served as the antidote to the toxic effects of the morphine.

Dr. Cattell: I should like to ask Dr. Angevine whether there are some points in the management of arthritis that it might be profitable to discuss.

Dr. D. Murray Angevine: I think practically every drug has been used in the treatment of arthritis. I will mention just two types, rheumatoid arthritis and osteo-arthritis. The latter is apparently not related to infection. The ideal treatment for arthritis, just as for rheumatic fever, is rest. Sometimes it is impossible to provide rest, so we must do the best we can. We find that salicylates are of value in arthritis, but I think that is a rather general statement. We all use them because we know of nothing better, but practically 60 per cent of the patients that I see in the clinic will say 'I took aspirin, but it did not help me'. Rheumatic fever, of course, is an entirely different proposition. Our big agent for the treatment of arthritis, aside from rest, is physical therapy, and there are numerous methods by which it can be applied.

There are two points that may be of interest. It has been observed that patients with rheumatoid arthritis who become free from pain. This has been about one-half of the people who are jaundiced artificially are free from pain. It is obvious that such a method cannot be generally applied. However, such an observation is of value in that it may give us an indication as to the mechanism of pain in arthritis. In view of Dr. Wolff's statement that pregnancy relieves migraine it is of some interest that in a series of thirty pregnancies in patients with rheumatoid arthritis practically all were relieved of pain during their pregnancy. In fact, one woman said that she had gone through four pregnancies, and during them she was entirely relieved of her arthritis.

Dr. Arthur P. Richardson: Pain is, of course, without a doubt the principal reason for patients coming to doctors. It is the thing that patients usually want to be relieved of. They are not particularly interested in what the mechanism is, all they want is relief from their pain. I am not at all sure of the quotation of Pasteur, but I believe it runs like this: 'We would cure few, relieve many, and comfort all.' That is beyond doubt the outstanding duty of all doctors, at least from the point of view of the patient.

Dr. Joseph C. Hinsey: I have been concerned with mechanisms involved in pain rather than with drug effects on pain. However, I have been very much interested in this discussion. There are two or three points that occur to me. First, in the use of drugs which raise the threshold to pain, we are dealing with effects on peripheral or central mechanisms, and

probably both. It should be emphasized that the peripheral pathways traverse the dorsal roots of spinal nerves and the sensory roots of cranial ones. There are no afferent pathways aside from these.

In dealing with drugs which attack the efferent nervous mechanisms or smooth muscle directly, the phenomenon of relaxation of smooth muscles is a very important factor in the relief of pain. In Dr. Wolff's description of the relief of migraine by ergotamine tartrate and other drugs, the pulsations in the branches of the external carotid artery were reduced. I do not know what changes in the state of the smooth muscles of the arterial walls accompanied this reduction. However, in conditions in which pain is produced by anæmia and the resultant anoxia in tissues, relaxation of smooth muscle in the vascular bed induced by the action of drugs leads to an improvement of blood supply and helps to relieve pain. In physical therapy, counter-irritation may relieve pain by the induction of reflexes that relax smooth muscle both at the periphery and in the viscera, producing among other things an improvement of blood supply.

Second, there is one other place where drugs are used in the problem of pain that is of interest at the present time; that is, in the field of diagnosis. The use of local anæsthetics in the blocking of peripheral and visceral nerves gives information as to the possible relief to be obtained in painful syndromes by surgical procedures. Recently, Livingston has reported ten cases of atypical pain in the extremities produced by trivial injuries. He found that he could relieve pain by the use of local anæsthesia at the periphery in the 'trigger' zones and also by blocking the sympathetic trunks. It seems to me that the use of local anæsthetics such as procaine hydrochloride has an important rôle in the attack on a number of types of atypical pain.

Digestive Disturbances in Bottle-fed Babies

By N. LLOYD PRICE, M.D., M.R.C.P.

(From the *Medical Press and Circular*, Vol. CXC VII, 7th December, 1938, p. 520)

IN infancy a great variety of abnormal conditions, whether of intrinsic or extrinsic origin, are liable to precipitate a disturbance in the delicately balanced digestive mechanism. Broadly speaking, cases are classifiable into two groups, (1) those due to defects in the child and (2) those due to defects in the diet.

FEEDING DISORDERS ARISING FROM DEFECTS IN THE CHILD

No attempt is made in this paper to discuss disorders resulting from congenital defects in the gastro-intestinal tract, or abnormalities in its muscular innervation. This excludes from consideration such highly important conditions as congenital pyloric stenosis, pylorospasm, etc. The group of cases now being considered are divisible into three classes:

- (a) Parenteral infection.
- (b) Gastro-enteral infection.
- (c) Nervous or psychogenic.

(a) Parenteral infection

In a surprisingly high proportion of artificially fed infants with acute or chronic indigestion, or who are merely classifiable as 'marasmic', the major presenting symptoms are actually the reflection of some more deeply seated or 'parenteral' pathological process which can easily escape detection. Such parenteral infections include otitis media, pyelitis, pneumonia, empyema, etc., and no dietetic regime can hope to be successful until such foci of toxic dissemination receive appropriate treatment. The acceptance of this premise saddles the attending practitioner with the responsibility for making careful aural and urinary examinations in all cases of unexplained or unresponsive 'D. and V.' or wasting, as well as frequent clinical and, if need be, radiographic, examinations of the chest. A note of warning may be sounded here with regard to the interpretation of late urinary findings in any severe case of vomiting and diarrhoea, as such urine is almost invariably loaded with casts and contains albumin and perhaps blood.

Ætiological significance should only be attached to urinary pathology at an early stage of the disease and before the onset of dehydration.

(b) Gastro-enteral infection

There is still a surprisingly widespread belief that diarrhoea and vomiting in infancy is synonymous with gastro-enteritis and is due to some form of infection. Actually, the weight of evidence appears to prove that infective gastro-enteritis due to any recognizable pathogenic organism is rare. Inability to culture such organisms support this view, as does attendance at post-mortem examinations on fatal cases which almost invariably reveal a striking absence of demonstrable gastro-enteral pathology. In point of fact, we have no right to presume in the majority of cases anything more than gastro-enteral irritation by certain abnormal products of digestion and bacterial decomposition. That dietetic unwisdom on the one hand, or a disturbance of digestive function on the other, may be alone accountable for this is amply borne out by the history, course of response to treatment of the bulk of cases. The possibility of true infective gastro-enteritis must not, however, be lost sight of, and in so far as the clinical picture of the developed condition is closely similar, whatever the cause, precautions against case-to-case infection should be instituted wherever necessary.

(c) Nervous or psychogenic

Nervous indigestion is by no means uncommon among infants and may cause serious difficulty. The nervous baby is usually the offspring of nervous parents, and its symptoms develop within, and are aggravated by, the atmosphere of nervous tension with which it is encircled. It is for this reason that in all cases, treatment of the parents is at least as important as treatment of the baby. The following are some common feeding disorders attributable in whole or in part to the nervous diathesis:—

Acrophagy.—As a result of the restless, excited manner in which the infant attempts to bolt its feeds, there is inco-ordinate suction and excessive air swallowing. This is liable to result in vomiting from the too forcible subsequent expulsion of the swallowed air. Constipation is usual, but in some cases downward passage of air into the over-sensitive intestine causes increased peristalsis, colic and diarrhoea.

Treatment consists in quietening the baby by giving 1 grain of chloral or 2 grains of bromide 20 minutes before feeds. The use of thickened feeds may also be helpful, as will wrapping up the child in a blanket to control the constant twisting of limbs and body as it is being fed.

Habitual vomiting.—This may have owed its origin in the first instance to some minor dyspeptic upset, and been maintained thereafter by the deep imprint of a reflex pathway on an abnormally sensitive and suggestible nervous system. Some cases may be allied to pylorospasm, and it is perhaps for this reason that they sometimes respond to belladonna. A combination of 2 minims of tincture of belladonna and 1 or 2 grains of bromide may be given shortly before feeds. Thickened feeds, which are less easily vomited than ordinary feeds, may again be proved of value. Bengel's food is sometimes employed for this reason.

Rumination.—This is a rare but interesting condition, seen most commonly in girl babies. By throwing back its head and opening its mouth, the infant contrives to bring back some of the feed into the mouth, where it is re-tasted. Danger lies in the fact that a little is lost each time. Treatment consists in constantly distracting the child's attention in an attempt to break the habit. Feeds thickened with cornflour may be tried.

FEEDING DISORDERS DUE TO FAULTS IN THE DIET

This subject can best be considered under three headings:

- (a) Underfeeding.
- (b) Overfeeding.
- (c) Unbalanced feeding.

(a) *Underfeeding*

Underfeeding remains one of the commonest causes of failure to thrive, and there are certain special reasons which make it so apart altogether from any question of ignorance or neglect. Thus it is not always recognized that certain babies, particularly the thin, active and rather fretful type, require more than the normal calorie allowance to maintain progress. As much as 60 calories per pound of body weight, instead of the usual 40 or 45, may be necessary to feed the greedy fires of metabolism in this type of infant, and unless this abnormal requirement is met underfeeding is inevitable. Furthermore, it must be admitted that the condition is not infrequently overlooked altogether owing to the supervention of vomiting, colic and sometimes a form of pseudo-diarrhoea (incontinence diarrhoea), which obscures the orthodox clinical picture. These confusing symptoms are partly the result of repeated air swallowing due to the too eager gulping of a hungry baby at an unsatisfying meal, and partly to the irritable condition of the gastro-intestinal tract and, in fact, of the whole of the nervous system, which is a usual feature of the condition. It is for this reason that it is often advantageous to give for a day or two small doses of bromide or chloral shortly before feeds in these cases, and to increase feeds rather cautiously so as to avoid the risk of perpetuating what may easily turn into a vomiting habit.

There is another type of marasmic infant which should perhaps be regarded as a special problem in underfeeding. This is the baby who appears to require more food than its stomach will hold, and who makes no progress on feeding mixtures of ordinary calorie value. The various theories which have been advanced to explain this condition need not concern us. When all have been given due weight, it still appears that we do not know. What is quite certain is that many such cases of infantile atrophy will only thrive on highly concentrated feeds, such as the following butter-flour mixture (McLean and Fales' modification).

Three level tablespoonfuls of melted butter are heated in a shallow pan over a slow flame until foaming occurs, and no further odour is given off (4 to 5 minutes). Add 5 level tablespoonfuls of wheat flour and again cook gently with constant stirring until the mixture begins to brown (4 to 5 minutes). Two level tablespoonfuls of cane sugar and 1 pint of water are now added, and the whole cooked for 20 minutes. When cooked, make up to 1 quart with previously boiled milk.

This mixture is readily taken by most infants. Extra water should be given at night or between feeds.

(b) *Overfeeding*

Mild degrees of overfeeding are normally corrected by simple possetting, and effortless process of regurgitation whereby the baby rejects what it does not require. It must be sharply distinguished from the vomiting of dyspepsia set up by any severe degree of overfeeding. Such dyspeptic vomiting, which is usually accompanied by colic and diarrhoea, with the passage of copious undigested stools, must receive prompt treatment or the condition may rapidly deteriorate into one of great gravity, and is then indistinguishable from the later stages of any other acute dyspeptic upset.

In passing, it should be noted that just as there is a high calorie baby requiring more than the normal food allowance, so at the other end of the scale there is a low calorie baby, usually of a rather fat, placid type, who may show signs of overfeeding with a normal, or even less than normal, calorie quota.

(c) *Unbalanced feeding*

There is no doubt that lack of proper balance between protein fat and sugar underlies many of the most obstinate cases of digestive disturbances in the artificially fed. An unsuitable mixture leads sooner or later to the development of dyspepsia, with loss of tolerance for the particular element which has been present in excess, or even for milk in any form, and once lost, normal tolerance is very difficult to regain.

This question of tolerance is closely bound up with particular idiosyncrasies on the part of the baby, as well as with its general health, since a type of feed which a healthy baby can quite easily deal with may prove almost lethal when tolerance is lowered by an acute infection.

Disorders resulting from faultily balanced feeding can best be considered from the point of view of the main presenting symptoms or groups of symptoms, *viz*, wasting, constipation, diarrhoea, vomiting.

(i) *Wasting with constipation*

This combination of symptoms is seen in a form of infantile atrophy due essentially to a diet containing excess protein and fat and too little sugar. It usually occurs in infants fed on unmodified or insufficiently modified cow's milk, and is for this reason sometimes referred to as cow's milk atrophy. The babies look toxic and are pale, wasted and pot-bellied. There is well-marked constipation with the passage of stools pale yellow or dirty white in colour, alkaline in reaction, and somewhat offensive. If fat is sufficiently excessive, the stools may contain much white cheesy, curdlike material—so-called soap stools.

The treatment required is a diet low in protein and fat and rich in carbohydrate. Because of its low fermentability, the ideal form of carbohydrate is one of the marketed preparations of dextrin and maltose. Mead's dextrin-maltose, Glaxo malto-dextrin or Mellin's food are excellent for this purpose, and can be added in amounts up to twice the usual quantity recommended, to partially or, if need be, wholly skimmed milk diluted with half its volume of water. For older babies, Savory and Moore's, Neave's or Ridge's foods, which contain a higher proportion of unconverted starch, can be used. Severe cases do well on some form of malt soup, which can be made up with a dried preparation such as Maltosan. The best treatment of all is breast milk.

(ii) *Wasting with diarrhoea*

Babies with persistent or recurrent diarrhoea of dietetic origin are usually found to be receiving too much sugar. In many cases there is a low fat tolerance also. The undigested sugar and fat undergo bacterial fermentation in the lower bowel, with the formation of acid and gas, and giving rise to the frequent green, irritating and rather frothy stools which are a characteristic feature. There is colic, fretfulness and loss of weight, and the highly acid motions cause raw and excoriated buttocks and thighs. The advent of any marked degree of vomiting carries the case into the more serious category of an acute dyspepsia, which would be more appropriately considered in the next section.

The aim of treatment is to supply a diet low in sugar and moderately low in fat, but with a relatively high proportion of protein. Partial replacement of sugar by dextrin or dextrin-maltose will avoid the necessity for too drastic a reduction in total carbohydrate. Most cases do well if combined with this manoeuvre powdered casein or calcium caseinate is added. The latter can be given as Casein in amounts of one drachm or more per feed. A temporary reduction in fat content is always a wise additional precaution.

It will be seen that partially skimmed cow's milk fulfils the low sugar, low fat, high protein requirement quite well and, in actual fact, skimmed milk has often been employed successfully for these cases. Even more valuable is lactic acid skimmed milk, or even lactic acid whole milk. Lactic acid milk, which has become widely used in recent years for a variety of conditions, is prepared as follows:—

One pint of milk, skimmed as required, is boiled and allowed to cool. When nearly cold, up to 45 drops of lactic acid (B. P.) is added, with constant stirring. A suitable form of sugar is added and the mixture given at not more than blood heat.

Dried forms of lactic acid milk are now sold, such as Lacidac.

(iii) *Vomiting with diarrhoea*

This is the usual manifestation of the acute forms of dyspepsia of dietetic origin. The immediate cause is generally considered to be a combined excess of fat and sugar in the diet, but there is actually no sharp line of distinction between this group and the foregoing. As a matter of fact, fat exerts a peculiarly aggravating effect on all forms of infantile dyspepsia, so that, whatever the nature of the initial disturbance, a more or less severe degree of fat intolerance is likely to supervene at any time, and will thereafter gravely prejudice the whole course of the illness.

The special danger inherent in the combination of vomiting and diarrhoea is the rapidity with which serious loss of fluid and salts occurs. This, together with the associated metabolic disturbance, is revealed clinically as dehydration, intoxication and acidosis. And it cannot be too strongly emphasized that with the onset of dehydration the case enters upon a new and deadly phase, warranting the same anxious attention that would be meted out to an abdominal emergency.

The sunken fontanelle, the scooped-out orbits, the loss of skin elasticity and turgidity, together with the ashen pallor and ominous apathy, are characteristics which render well-established dehydration immediately recognizable. Detection of earlier signs of dehydration requires a more experienced eye, but its presence or imminence should be inferred whenever there is rapid loss of weight, and scanty output of urine in a baby exhibiting vomiting and diarrhoea. Clinical evidence of acidosis is provided by deep, rapid or hissing respirations, and confirmed by urinary examination, if such be possible. Cyanosis is an even more grave complication in these cases.

Diarrhoea and vomiting may be the final expression of any of the three ætiological groups—parenteral infection, gastro-enteral infection and dietetic error, and the following remarks are to be regarded as applicable to all cases in which this complication arises:—

THE TREATMENT OF DIARRHOEA AND VOMITING

Space will permit only a brief indication of the general lines of treatment. In addition to this, it must be understood that in some cases special measures will be necessary for dealing with parenteral foci of infection.

In all cases, the first necessity is to stop all food by mouth for a period of 12 to 24 hours. Half to one drachm of castor oil is of value if the case is seen early, but the risk of causing or increasing dehydration must always be considered. During the initial period of starvation small amounts of half-strength saline with glucose may be given at hourly intervals to allay thirst and maintain fluid reserve. Washing out the stomach with normal saline will sometimes stop vomiting completely. Following this initial period of starvation, treatment depends entirely upon the condition of the patient, and more particularly upon the presence of dehydration.

In mild cases in which vomiting has ceased and diarrhoea lessened, it should be possible to embark cautiously on small non-irritant feeds, such as breast milk, peptonized milk, or Secway, proceeding later to a low fat infant food, such as Allenbury No. 1, half-cream Cow & Gate, or Nestle's. Fluid requirement is at least 2½ ounce per pound of body weight in 24 hours, and it is vital to ensure that this is met by giving extra water or saline by mouth or by the rectum.

In more severe and persistent cases with clinical evidence of dehydration, drastic measures for the restoration of fluid and salt lost are immediately imperative. Every available route for the transport of fluid to the tissues may have to be commandeered. The alimentary pathway is useless, but there are three recognized parenteral routes: subcutaneous, intraperitoneal and intravenous. Of these, the last two are the only methods of real value in severe cases, and although as much as 400 to 600 c.c.s. of saline can be given intraperitoneally, in divided amounts, during 24 hours, continuous intravenous drip transfusion is the

method of choice. By this means 5 per cent glucose in normal saline may be introduced at the rate of 20 to 30 c.c.s. per hour, and the effect is often dramatic. Transfusion can be maintained if necessary for several days, during which time only tiny amounts of fluid are given by mouth. After a variable time, dependent upon the condition of the infant, and before stopping the drip, oral feeding may be recommended.

Following an acute dyspepsia of the type we have been describing, the alimentary mucosa should be regarded as being acutely hypersensitive to anything other than very small amounts of milk. For this reason the return to normal dietary must be a gradual building-up process, rather akin to desensitization. It has been well said that the quantity of the feed is more important than the quality, and it is advisable to commence with feeds as small as 1 or 2 drachms every 2 hours, alternating with equal amounts of plain water. Milk feeds can be gradually increased a drachm at a time, reverting to very small amounts on the slightest sign of intolerance. Similar types of feeds to those mentioned in the treatment of mild cases may be employed, although it is worth noting that, with careful attention to quantity, lactic acid whole milk has been used with equal success.

Sciatica and Its Treatment

By WILFRED HARRIS, M.D., F.R.C.P.

(From the *British Medical Journal*, Vol. II, 17th December, 1938, p. 1245)

SCIATICA, or pain which is referred along the course of the sciatic nerve, may arise from a great number of causes. One of the commonest is a perineuritis of the sciatic sheath in the region of the sciatic notch where the nerve escapes from the pelvis into the buttock, which may be due to the spread of rheumatic or gouty fibrositis of the lumbo-sacral fascia or lumbar muscles, known as lumbago.

The nerve trunk may be the subject of a neuritis from toxic causes, such as diabetes, lead, arsenic, etc., or an infective neuritis from dental sepsis. I have known it produced by a direct chill to the buttock from sitting on a cold wet seat; and trauma to the buttock from a fall in the hunting field or prolonged pressure from lying on a hard surface, as in coma due to mine explosions, will produce it.

TYPES OF SCIATICA

One may speak of two types of sciatica, high sciatica and low sciatica, the latter form being due to lesions in the neighbourhood of the sciatic notch, as already referred to. In this type the Achilles jerk is often lost, and there may be a tendency to lean over towards the affected side. High sciatica would be due to lesions in the neighbourhood of the intervertebral foramina around the fourth and fifth lumbar nerves, due to rheumatic or septic inflammation, or even to osteoarthritis. In this form the Achilles jerk is usually unaffected, as this reflex is concerned in the first sacral root, and there is often well-marked contralateral scoliosis in which the hip on the affected side is thrown outwards and the patient leans away from that side. In these cases forcing the body into an erect position causes pain down the affected leg. In this type of case, unless contractures have developed after many months of suffering, the scoliosis disappears on lying flat, especially if the legs are pulled down, with the body held to resist the pull. This disappearance of the scoliosis without producing pain is probably due to the nerve roots no longer being pressed on at the intervertebral foramina, and is a demonstration that the contralateral scoliosis apparent on standing is an involuntary posture assumed by the patient to relieve the pressure at these points and is not caused by arthritis of the intervertebral articulations, as asserted by Putti.

ÆTIOLOGY

Pain in the sciatic distribution may be caused by many forms of bony abnormality, such as sacralization

of the fifth lumbar vertebra, or a separate first sacral piece which may be called a sixth lumbar vertebra. Sacro-iliac subluxation from trauma or due to the flat back acquired on an operating table under a prolonged anæsthetic is another cause of pain in the region of the lower part of the buttock which may be associated with pain down the back of the thigh. This pain, which is sometimes agonizing, may be due to the lumbosacral cord being pressed on by the sharp edge of the sacrum at the sacro-iliac joint. These cases are sometimes dramatically cured by manipulation under an anæsthetic.

Bony disease in the pelvic bones, such as Paget's disease affecting the ischium, or other tumours of the pelvic bones or in the pelvis, secondary malignant growths in the lumbosacral spine, or tumours in the lumbosacral cord or cauda equina, have all to be considered in the diagnosis of obscure cases of pain in this region. What may be called malignant sciatica is by no means an uncommon sequel of carcinoma of the breast.

In the diagnosis of these cases care must be taken to examine for muscular wasting in the leg or thigh, for patches of anæsthesia, or for alterations of the deep reflexes. If the knee-jerk is diminished or lost we know at once that the case is not a true sciatica, but that the anterior crural system is involved. Lumbar puncture and examination of the cerebrospinal fluid may give a clue in tumours low down in the spinal canal involving the sacral cord or cauda equina. Besides the more usual forms of tumour such as fibroma or sarcoma, cysticercus, lipoma, and chronic arachnoiditis, with cystic formation, may be mentioned, and herniation of the body of an intervertebral disk. These will scarcely show in radiographs, except with careful lipiodol pictures. The pressure may be found to be below normal, and there may be other evidences of spinal block, with high protein content in the fluid.

Tuberculous caries of the ilium or sacrum, with or without psoas abscess, or intrapelvic pressure from a high forceps delivery in childbirth may press upon the nerve and cause severe dropped foot, with anæsthesia of the sciatic distribution. I saw one such case, with left sciatic paralysis, in which delivery was accomplished under an anæsthetic. There was also paralysis of the musculo-spiral nerve on the right side from arm pressure against the edge of the table. The diagnosis which had been sent up with the case to hospital was 'crossed paralysis'.

Osteo-arthritis of the hip-joint may cause pain not only in the region of the hip and knee but even down to the ankle, and true sciatic neuritis may result from spread of the inflammatory reaction around the hip-joint to the sciatic nerve, which passes only half an inch behind it. In all cases it is advisable to examine the movements of the hip-joint to make sure that they are free. In many cases of sciatica, whether of the low or the high type, the pain will be increased by stretching the nerve, as by flexing the hip with the knee straight. This sign is usually known as Lasègue's sign, which is precisely the same as Kernig's sign in meningitis. Patients suffering from sciatica usually prefer to lie on the opposite side, with the affected knee slightly drawn up, and a pillow should be given to separate the knees, with a curved support under the bedclothes to prevent the weight pressing on the foot.

POINTS IN DIAGNOSIS

There are many points, therefore, to attend to in the diagnosis of a case of apparent sciatica when first presented: knee-jerks and Achilles jerks should be compared with those on the other side, muscular wasting should be looked for, and the sensation also tested. The hip-joint should be moved and the nerve stretched gently to look for increase of pain, and a rectal examination is generally advisable. If the knee-jerk is diminished, tabes dorsalis may be thought of and the pupils examined, or alcoholic or diabetic neuritis looked for.

Tenderness over the notch in the buttock and along the upper part of the nerve is common in the low type of sciatica, but usually this is not present in high

sciatica with contralateral scoliosis. There is no wasting of muscles in the common rheumatic types of sciatica, either of low or high type, except in the very chronic cases of many months' or years' duration, when the nerve may be actually shrunken and cord-like. In such extreme cases it will be necessary to cut down upon the nerve and scarify it longitudinally in order to free the adhesions.

TREATMENT

The treatment of sciatica will vary according to the type. In the low type of sciatica, especially when there is tenderness at the notch and the patient leans towards the affected side, rest in bed should be insisted on, and local heat by radiant-heat lamp or infra-red rays may give considerable relief. Some practitioners favour short-wave radiotherapy, and I have seen this successful when most other treatments have failed, but as a rule I have not found diathermy to be of much service. Galvanism often aggravates the pain in the acute stage of sciatica, though in the chronic stage it sometimes may prove valuable. Moist hot packs, such as cataplasma kaolini or mud packs, or mud baths at Harrogate or at the Continental spas such as Pistany or Acqui, may be given in chronic cases where the patient is able to walk. The very acute cases must be treated in bed. Local applications of liniments, such as A.B.C. or methyl salicylate, may be applied in addition to hot packs, and for the acute pain analgesics should be used freely. Compound aspirin tablets with or without codeine, and in more severe cases pyramidon, heroin, and medinal cachets, or actual injections of omnopon or morphine, may be necessary to tide the patient over the severe attacks of pain and to produce sleep.

Two methods of massive injection of novocain and saline may be used with great benefit in a large proportion of cases, and sometimes rapid cure may follow their use. In the low type of sciatica such as that following lumbosacral fibrositis, in which there is tenderness on pressure over the nerve in the buttock and at the notch, the injection may be made into the nerve trunk itself at the notch and a second injection at the level of the small trochanter. This is not the place to give the details of the method of injection, but 2 c.cm. of 2 per cent novocain are first injected into the nerve and then 80 to 100 c.cm. of normal warm saline. A second injection may be of service a few days later. This method of injection of the nerve was first used in 1902 by Lange.

Another method of epidural injection was advocated in 1901 by Sicard—by injection of novocain and saline up to 100 c.cm. into the sacral canal through the sacro-coccygeal foramen. Owing to the sacral canal not communicating with the intrathecal space, which ends at the level of the lower end of the first piece of the sacrum, the saline forces its way upwards outside the theca, stretching the sacral and even the lumbar roots as they emerge. This method is probably of greater service in the high form of sciatica. Other solutions are sometimes used, such as 10 to 20 c.cm. of a 40 per cent solution of antipyrine, as Feilung recommends.

For obstinate chronic cases Dogliotti's method of intraspinal injection of absolute alcohol has been recommended; but it is a dangerous treatment, and should not be undertaken by a novice. I have used it with success in a case of eight years' severe constant pain and misery due to sacralization of the fifth lumbar vertebra, procuring several months' complete relief of pain, though for the first fortnight sphincter paresis was present.

Fixation of the limb with a Liston splint along the side has been advised, but I do not recommend it, as patients usually cannot bear to be kept in a fixed position for many hours. Another form of fixation is sometimes of benefit—namely, a plaster jacket, applied with the patient slung up by the armpits and head so as to stretch the spine, the plaster bandages being applied from under the armpits to just below the level of the great trochanters. The advantage of a plaster jacket is that the patient can get about and even

attend to his business, in reason, though it has certain obvious disadvantages. An alternative is keeping the patient confined to bed, with the feet raised on six-inch blocks, and extension to the spine applied by means of leather anklets attached by cords running over pulleys fixed on the foot of the bed to separate shot-bags weighing 6 to 8 lb. A certain amount of counter-extension by padded axilla rings tied to the head of the bed will probably be necessary in addition to the raising of the foot of the bed on blocks. This method of extension does not preclude a certain amount of lateral movement or rotation by the patient, and the weights are easily detached at night or for toilet purposes.

If a plaster jacket is applied it is very important that proper extension to the spine, including the neck, should be arranged for during the whole period of the fixing of the plaster and its setting. This is best done by the use of Sayre's extension apparatus, with tripod and pulleys fixed to leather hands for the chin and occiput, and axilla pads. The patient is slowly and carefully raised by the pulleys on to his toes, most of the weight being taken by the arms. If raised in this way the patient can remain quite comfortably semi-suspended while plaster bandages are applied from axillæ to trochanters over a stockinet vest, the bony prominences, such as the iliac crest, being well padded with adhesive felt, known as elephant plaster.

CONCLUSION

Briefly, therefore, the treatment of an acute severe sciatica should be complete rest in bed, with local anodyne liniments and cataplasma kaolini, and sometimes local heat by infra-red rays. Analgesic drugs must be given, such as aspirin, phenacetin, and caffeine tablets, with or without codeine or opium, and even morphine or heroin injections may be required for a few days. Sleep may be obtained by the use of $7\frac{1}{2}$ grains of medinal with two veganin tablets. Massage must never be used in the acute stage. Later in the more chronic stage massage may help, and galvanism, diathermy, or local heat should be tried. If these fail, massive injection of the nerve or epidural injection by novocain and saline, and extension by weights attached to anklets, with counter-extension at the axilla, should be tried. If these give only temporary relief, it may be advisable to fix a plaster from the axillæ to the trochanters so that the patient may be able to get about and attend to a certain amount of business.

Glandular Fever

By F. R. B. ATKINSON, M.D.

(From *Medical Press and Circular*, Vol. CCI, 18th January, 1939, p. 52)

Synonyms.—Many names have been given to this disease, the two chief of which are infective mononucleosis and monocytic angina. Description: Glandular fever is characterized by three chief symptoms, fever, enlargement of the lymphatic glands, and a lymphomononucleosis.

History.—In 1885 Filtaow described a disease, which is now recognized as glandular fever, and in 1888 Korsakoff shortly mentioned the condition. In 1889 Pfeiffer first made use of the term glandular fever for a disease, which caused enlargement of the cervical glands, accompanied by fever, pains in the limbs, and general unrest, with recovery in a few days, and it is from this date the history of glandular fever begins. In addition to this slight form, Pfeiffer described acute cases which lasted longer and were associated with an enlarged spleen and liver, and a third form he called subacute, in which the disease especially attacked abdominal glands. At the same meeting, Heubner reported the presence of exanthemata, and in two cases nephritis occurred. Shortly afterwards, Starck reported on two cases, and drew attention to the frequent implication of the submaxillary as well as of the cervical glands. He was the first to mention a convulsive form of cough, which suggested affection of the

bronchial glands. One of the cases suffered also from hæmorrhagic nephritis during the course of the disease. In the same year Rauchfuss described two cases, one in a boy and one in his sister. In 1894, Desplats was the first to report swelling of the axillary and inguinal glands. In 1896 West described the first epidemic of the disease. For many years opinions varied as to glandular fever being a disease *sui generis*, and it was not until 1920 that Sprunt and Evans reported on six cases in adults under the title of infectious mononucleosis and submitted the blood to careful examination. The blood findings were the same in all the cases: the white blood cell count was normal at first and was followed by a leucocytosis, the mononuclear cell being markedly increased. They pronounced in favour of an infectious origin and considered the disease a clinical entity, and this view was supported by Tidy and Morley, and repeated by Tidy and Daniel. They also believed glandular fever and infective mononucleosis were identical. In 1930 Glanzmann published an important monograph under the name of lymphæmoid glandular fever, and in the same year Radford and Rolleston reported two cases which were at first diagnosed as typhus fever, and drew attention to the presence of a positive Wassermann's reaction with no evidence of syphilis, and Parkes Weber noted the same occurrence. In 1932 Lehdorff and Schwarz went minutely into a description of the disease in all its aspects in the most complete monograph extant. In this year Paul and Bunnell discovered the presence of heterophile antibodies and suggested they were pathognomonic of the disease, a view opposed by Wolf. In 1933 Cardelle y Penichet found protein therapy, especially of casein, gave first-rate results in cutting short the time of the disease and preventing complications. In 1936 Tschilow noted the presence of glandular fever after quinine poisoning, and Sucher and Schwarz the association of the disease with meningoencephalitis. Gsell reported on the presence of serous meningitis in glandular fever. Lumbar puncture revealed increased pressure of the spinal fluid, which contained almost entirely lymphocytes, an increased amount of albumin, with a mastix reaction deviation to the left and a double curve by the gold sol test.

Symptomatology.—The chief symptoms of glandular fever are enlargement of the glands, fever and a lymphomononucleosis of the blood with atypical young cells. Pfeiffer, as we have seen, only described swollen cervical glands, but it is now generally recognized the whole lymphatic system may be involved, including the spleen. Transitional cases also occur, in some of which there may be no fever and in others no detectable enlargement of the glands. Glanzmann distinguishes five phases in glandular fever:—

(1) *Incubation.*—This period lasts from 7 to 8 days in most cases. (2) *Prodromal stage.*—This is usually short, but may be prolonged from 2 to 4 weeks, during which time the patient suffers from tiredness, malaise, pains in the abdomen, in the region of the navel, loss of appetite, outbreaks of perspiration, and a change in the colour of the face is often noted. (3) *Febrile stage and initial symptoms.*—Six different forms are described: (a) *Septic type.* High fever suddenly occurs but there is no evidence of an angina or disease of the internal organs. Vomiting is frequent, with pains in the head and limbs, and there is a great tendency to sleep. Swelling of the glands may be slight, but the spleen may become very large. The fever usually lasts from 2 to 5 days, but may only exist for one, or may continue for more than 14 days. (b) *Anginose form.* Here the fever comes on suddenly and may be high, and the condition is ushered in by swelling of the tonsils with or without a deposit similar to diphtheria. (c) *Pharyngeal type.* The follicles of the pharynx are enlarged and red, and all the glands may in time become enlarged. (d) *Thoracic type.* Catarrh of the upper air passages and bronchitis, with a cough similar to that met with in pertussis, are the chief signs. (e) *Abdominal form.* In this type the symptoms suggest an acute abdominal disease such as appendicitis, with the presence of fever

and colicky pains. The mesenteric glands first become swollen, followed by those of the axillary, inguinal and the cervical regions. (f) Slow, mild type. Only slight fever is present, or it may be absent altogether. The glands become swollen, but the child hardly feels ill.

(4) *Stage of glandular swelling.*—The glands begin to swell in all parts of the body, or the enlargement may be confined to one set of glands. The spleen may become increased in size and sometimes the liver.

(5) *Convalescence.*—The fever disappears and all the subjective symptoms vanish, but the enlarged glands may still be felt in many instances. The blood changes are slow in returning to the normal. Recurrences of fever may take place. The forms described above are now generally confined to three, the lympho-glandular, the anginose and the leukæmoid. The first is by far the commonest form and is the classic type described by Pfeiffer, who, however, did not describe enlargement of any of the glands except those of the neck. It occurs chiefly in children. In the anginose form, the affection of the pharynx dominates the picture. This form is more often found in elder children and young adults. The leukæmoid form of Lehdorff and Schwarz is a severe, septic, systemic disease, with a marked lymphomonocytic blood reaction predominating. This is the form that is often mistaken for leukæmia.

The initial symptoms of glandular fever are fever, enlargement of the lymphatic glands, especially first the cervical and catarrh of the pharynx. Pains in the back of the neck precede the swelling of the glands. Epistaxis is an early symptom and marked asthenia, especially in adults, is very characteristic. Headache and pains in the bones are very frequent. Vomiting may be so severe that no food can be taken. Cerebral symptoms are very frequent: somnolence, but more often excitability, sleeplessness, nightmare, delirium at night; signs of meningismus are not rare.

Fever.—The absence of fever is very rare, although such cases have been described in a few patients. It shows no distinctive type and thus differs from the exanthemata. It is common for the temperature to rise quickly to 101°F. or 102°F., and remain at this height for 1 to 5 days, with morning remissions, and then quickly or slowly to become normal. In other cases, the fever may persist for two or three weeks. In septic cases it may remit or intermit, similarly as in malaria and in other cases, the evening temperature may reach over 102°F. for some days. A temperature similar to that met with in typhus fever has been described. The highest temperature recorded seems to be 105.8°F. The fall of the fever is usually by lysis, but in some very rare cases by crisis. Relapses are common, and Glanzmann has found them to occur with a rise of temperature from the 9th to 10th, 13th to 14th, and 19th to 24th days. Fever and the glandular swellings are not dependent on each other: the rise of temperature may occur with swelling of the glands, may precede it, and be for a time the only symptom of the disease, or generalized swelling of the glands may precede the fever by days or weeks. It is also noteworthy that the severity of the glandular swelling is not related to the fever. In the severe, septic cases with high fever, the glands are often quite small, and conversely, the temperature may be slight with great enlargement of the glands.

Lymphadenopathy.—The cervical glands are usually the first to become enlarged, followed by those of the axillary, inguinal, and other glands. The left cervical glands are much more often the first attacked than the right. Abscess formation, though known to occur, is very rare. It is uncommon for the axillary glands to be primarily affected, as in Glanzmann's case, and the same applies to the inguinal glands, but the same author has seen such a case in a boy aged 12 years. In the thoracic form there is a primary affection of the mediastinal, peribronchial and perihilar glands, giving rise to fits of coughing similar to those met with in pertussis, and in some cases accompanied with hæmoptysis, so that the suspicion of tuberculosis is aroused.

Enlargement of the spleen.—The spleen is palpable in about one-third of the cases: in some cases the

splenomegaly is almost the only morbid sign present, and enlargement of the glands is almost absent, and to this form the name 'splenic' has been given. The enlargement may remain for years.

Hepatomegaly.—In a number of cases the liver is enlarged, with the presence of urobilinogen in the urine. Jaundice has also been described in the adult, but Glanzmann was the first to find it in the child. To the cases with only enlargement of the spleen and liver, Glanzmann has given the name 'visceral' form.

The blood.—The chief characteristic of the blood is a high percentage of mononuclear cells, 80 to 95 per cent. In some cases there is a decreased number of leucocytes. There is a relative and absolute increase of lymphocytes, and a large number of immature and pathological forms of cells with a marked tendency to plasma-cell change in all stages of maturity. The number of white corpuscles varies between 10 to 25,000, and only rarely reaches 50,000 and more. For only a short time is there a neutrophile leucocytosis, which reaches its maximum between the 5th and 9th day of the disease, then decreases in absolute value, but remains as a relative lymphocytosis for a long time. The eosinophiles never disappear altogether. The erythrocytes are not altered in number and the percentage of hæmoglobin is normal, so that there is no anemia. The degree of the blood changes is not a measure of the severity of the disease. The condition is slighter and quicker recovered from, the more marked at the beginning is the pathological mononucleosis, while in severe cases the mononucleosis only develops slowly. There is a certain parallel between the degree and the extent of the glandular swellings and the intensity of the mononucleosis: very marked swelling of the glands may occur with only a moderate pathological mononucleosis, and, on the other hand, slight enlargement of the glands may be present with a very marked blood finding.

Glandular fever may appear epidemically or sporadically. It has been described in nearly all parts of the world: England, France, Germany, Italy, Switzerland, Russia, China, Australia, and in the United States of America.

Sex.—The male sex is much more frequently attacked than the female. In an epidemic in Bern, Glanzmann noted 160 cases, 96 of which were males and 64 females. In an epidemic affecting students Baldrige found 38 were males and 12 females. Konigsberger's figures were 15 boys and 3 girls and in an epidemic in the Falkland Islands, Moir states 52 were males and 36 females. The environment seems to have nothing to do with the presence of glandular fever, which has been called in America the students' disease.

Age.—The disease is one of children and young adults, but has been met with in more elderly people. It chiefly occurs between the ages of 5 and 8 years. Glanzmann found the majority of cases were to be seen between 2 and 8 years of age, with a maximum at 5 years. Tidy and Morley found 80 per cent of the cases affected children between 5 and 9 years. It is very rare in babies, but Glanzmann records a case in a baby of six months, which seems to be the youngest described, as I cannot corroborate the statement of Tidy and Morley, copied by Glanzmann, that Schäffer reported a case in a child four months of age, or their other statement that Robertson published a case in a child aged six months. The oldest case seems to be that of a man, aged 70 years, reported by Moir.

Sporadic cases occur at any time of the year, but epidemics are most frequent in the spring and autumn.

Complications.—In addition to those already mentioned, conjunctivitis, which is common, and parotitis should be included. When the latter is present, the condition suggests mumps. Stomatitis and pharyngitis are quite frequent. The angina may be catarrhal, follicular and lacunar, pseudo-membranous, diphtheroid and ulcerative.

Exanthemata.—These are not infrequent, but are not the essence of glandular fever. All sorts of rashes have been described: urticarial, scarlatinal, morbilliform, lichenoid. A rash similar to erythema multiforme, rubella and typhus has been reported.

Pathogenesis.—The actual germ has not been determined. A protozoon, a bacterium called *monocytogenes hominis*, spirochete, a fuso-spirillosis, and the streptococcus have been found.

Contagion.—The sporadic cases are not as a rule contagious. In epidemics, many cases may occur in the same family. How long glandular fever is infectious is not certain; Tidy thinks up to a week after the fever has disappeared.

Prognosis.—This is always good. The four cases of death reported were before the hæmatological era and are doubtful cases.

Prophylaxis.—Isolation of the patient for 14 days is advised by Tidy and Daniel, three to five weeks by Glanzmann.

Treatment.—The treatment is symptomatic. For combating the fever, quinine is the best remedy, and Glanzmann uses suppositories of hydrobromide of quinine, 0.1, and pyramidon, 0.02 to 0.1, at noon and in the evening. Rest in bed should be enjoined whilst the fever lasts. Aspirin has been used at the beginning to produce sweating. A fluid diet is advisable in the febrile stage. For disinfection of the nasopharynx, instillation of 3 per cent collargol solution is valuable, and if the nose is badly obstructed 1 per cent solution

of supra-renal with half of boracic water; in small children, camphor or eucalyptus oil (1 per cent). In older children, gargles should be employed (1 per cent peroxide of hydrogen) and painting in the pseudo-diphtheroid forms with 5 per cent chromic acid, and in the fuso-spirillary forms, painting the ulcer of the tonsils with neo-salvarsan, 0.15 to 10.0 glycerine. In marked stomatitis, the lips should be painted with 1 per cent solution of permanganate of potash. When the glands are large, antiphlogistine should be used and in cases where they are small warm fomentations with boracic acid. Glandular swellings which are obstinate in clearing up do well under yatrien-casein injections; in children up to two years, 0.2 to 0.3; up to six years, 0.3 to 0.5; older children, 1.0 c.c.; one to three injections. Rubbing with soft soap with 5 per cent ichthyol added may also be used. The best results are provided by irradiation with the quartz lamp. In convalescence, cod-liver oil, malt extract with iron, a mixed diet of meat, vegetable and fresh fruit are indicated. If an abscess forms, punctiform incisions suffice. In the thoracic form, sedatives for the cough should be given, and in the abdominal form suitable diet, belladonna to stop the spasms, and moist, warm camomile compresses.

Reviews

SURGICAL PATHOLOGY.—By William Boyd, M.D., LL.D., M.R.C.P.Ed., F.R.C.P. (Lond.), Dipl. Psych. F.R.C.S. Fourth Edition. 1938. W. B. Saunders Company, Philadelphia and London. Pp. 886, with 476 illustrations and 15 coloured plates. Price, 45s.

PROFESSOR BOYD needs no introduction, and much less so his book on surgical pathology, which is being extensively used in all the English speaking countries, both by students and post-graduate workers. In the present edition, which has come out after 5 years, the author has thoroughly re-written the subject-matter in view of the rapid progress which has been made in the domain of pathology. He has also introduced a considerable number of new subjects of enormous surgical importance. The replacement of the introductory chapter, which is an excellent philosophical discourse on surgery in relation to pathology, will certainly be welcome to all readers. The style and presentation have been maintained fully up to the standard of Professor Boyd's works. To mention just a few, the chapters on the thyroid gland, breast, gall-bladder, bone, and stomach may be read with interest.

The reviewer is one of the many lovers of Professor Boyd's works and having studied his book very minutely he would like to put forward some of his personal comments for the improvement of the work. The most important point to be raised is the question of diagrams which are obviously, even to a casual observer, lifeless and artificial. A large number of them are not taken from actual morbid tissues, but have been drawn by hand. Even such common things as granulation tissue, tubercle, inflammation, common neoplasms, etc., which may be obtained in any number in any pathological unit to illustrate the typical histological pictures, have been treated in a diagrammatic manner. While the writer has spent so much money to illustrate by coloured pictures, conditions like gangrene of the foot, histology of gas gangrene, etc., he has effected economy in illustrating *Spirochaeta pallida* in a primary syphilitic lesion stained by Levaditi stain and by omitting to include any picture to illustrate the various types of pituitary adenomas. These are bad economy. Although this work is passing through the fourth edition, Professor Boyd has not made any sincere effort to replace his borrowed diagrams by his own originals. This is certainly a legitimate demand of the many readers of this book. Amongst his borrowed pictures, the number of which

is by no means small, the author has still retained some which are only of historical interest and should be replaced by good modern ones. Lastly, there are some diagrams in the text which can hardly be made out while there are others which are wrongly interpreted. On page 114, under blastomycosis, there is a picture which shows long filaments or hyphae. In page 127, under pulmonary embolism there is a picture which no one can make out, while the one in page 128 shows a very unreal picture of pulmonary infarct. In page 425, under tuberculosis of the kidney, there is a picture from which hardly any idea can be had of miliary tuberculosis of the organ.

A few points in the subject-matter may be mentioned to draw the attention of the writer for improvement. In dealing with some chapters, he has shown undue brevity. Although the author belongs to the country where the great Dr. Cushing did his monumental work on pituitary adenomas, he has spared just one page for their description in his book. Similarly, he does not seem to appreciate the work of Masson on carcinoid tumours of the appendix as he has chosen not only a poor picture of that morbid condition (*vide* page 340), and he has called it carcinoma of the appendix—a term which should no longer be kept in pathology. In discussing the pathogenesis of tetanus, he mentions that the toxin 'spreads to the sensory side of the cord'. His terminology in some places requires revision. For instance, no one should talk of 'carcinoma simplex', a term which conveys no meaning.

The above points are mentioned with a spirit of constructive criticism and should on no account be taken to lower the excellence of this admirable handbook which should adorn every library and which should be in the hands of every student and practitioner alike.

M. N. D.

CRANIO-CEREBRAL INJURIES: THEIR DIAGNOSIS AND TREATMENT.—By Donald Munro, A.B., M.D., F.A.C.S. 1938. Oxford University Press, London. Pp. xxviii plus 412. With 62 illustrations. Price, 21s. Obtainable from Oxford University Press, Bombay and Calcutta

THE aphorism of Hippocrates that 'no head injury is so trivial as to be neglected or so serious as to be despaired of' still holds good. With the mounting toll of street accidents head injuries present a greater degree of complexity, adding to the responsibilities of the

general surgeon. In 1932, it was estimated that the approximate number of fractures of the skull which occurred in the United States was around 112,000. In this book an effort has been made to present all known diagnostic and therapeutic methods, which are physiologically sound and, from practical experience, known to be effective. We have no doubt that this monograph on cranio-cerebral injuries will be accorded a warm welcome.

There are fourteen chapters in this book and 393 pages of printed matter. It is very creditable that, within such a small compass, room has been found for so much pertinent and valuable material. The arrangement of the subject-matter deserves special mention and is certain of grateful appreciation by all surgeons. General principles of treatment are first carefully described. Then there are two chapters on 'special non-operative methods' and 'special operative methods' of treatment. These are followed by two informative chapters on 'the non-operable' and 'the operable' groups of cranio-cerebral injuries. Here, complications of head injuries have been carefully discussed and the next chapter is devoted to the consideration of complications due to necessary treatment. There are also two chapters on convalescent care and first aid. Cranio-cerebral injuries in the newborn have not been omitted from special consideration.

This book is replete with valuable practical hints. Regarding the vexed question of 'position', the author states that in conscious and co-operative patients, the position which is most comfortable is the most useful. The printing, get-up and illustrations are all excellent. At the end of each chapter there is a complete bibliography and a useful index is appended.

We strongly recommend this book to the notice of the practising surgeon and the general medical practitioner, as it is one which they can ill afford to be without.

P. N. R.

STUDIES ON THE PHYSIOLOGY OF THE EYE.—

By J. Grandson Byrne. (Re-issue with supplement and new index.) 1938. H. K. Lewis and Company, Limited. Pp. xii plus 440. Illustrated. Price, 40s.

THIS volume deals with the original research work carried out by the author at different laboratories in England, on the continent of Europe and in America during the past twenty years. It consists of forty-four chapters divided into four parts. Part one deals with the paradoxical pupillary phenomena following lesions of the afferent paths. Part two with the preliminary palpebral widening; paradoxical palpebral and lens phenomena and inherent tonus phenomena. Part three with stimulation experiments and their effects. Part four with the inherent pupillary constrictor tonus and the mechanism of the still reaction, sleep, dreams, hibernation, repression, hypnosis, narcosis, coma and related conditions. In addition there is a supplement which deals with the effect of stimulation of the cortex cerebri upon the effector mechanisms which mediate movements of the iris and membrana tympani.

The book represents a tremendous amount of experimental work and forms most interesting reading. It is written in a clear, simple style and is provided with forty-eight illustrations.

To students of neurology and ophthalmology we recommend it as a book of reference.

E. O'G. K.

REFRACTION OF THE EYE INCLUDING ELEMENTARY PHYSIOLOGICAL OPTICS.—

By C. Goulden, O.B.E., M.A., M.D., M.C. (Cantab.), F.R.C.S. Second Edition. 1938. J. and A. Churchill Limited, London. Pp. xv plus 271, with 181 illustrations. Price, 12s. 6d.

THIS is the second edition of this book and as would be expected in the highly specialized branch of ophthalmology with which this volume is concerned there are no fundamental changes in the new edition. The whole of the text has however been revised. The

book consists of seven chapters on optics, the optical constants of the eye, the eye as an optical apparatus, errors of refraction, the ophthalmoscope, retinoscopy and finally the function of convergence and muscular anomalies. There is in addition a bibliography and 181 illustrations.

As the book is likely to be used extensively in India the reviewer would like to point out that the accommodative power of the eye diminishes much more rapidly in Indians, Anglo-Indians and Europeans born and brought up in India in contrast to people living in non-tropical climates. This is probably due to alteration in the consistency of the lens occurring at an earlier age. The average emmetrope in India becomes presbyopic at the age of 38 years.

The book is primarily written for the student preparing for the diploma in ophthalmology of the conjoint board of England but the author covers a wide field and so it will be of benefit to the ophthalmologist as well. The subject-matter has been presented in a simple practical way and on the whole the book is excellent. We strongly recommend it and only hope it will be widely read and if so it must lead to the general improvement in the art of refraction work in India.

E. O'G. K.

GARDINER'S HANDBOOK OF SKIN DISEASES.—

Revised by John Kinnear, T.D., M.D., M.R.C.P. (Ed.). Fourth Edition. 1939. E. and S. Livingstone, Edinburgh. Pp. xv plus 239, with 16 coloured plates, 5 from Dufayocour photographs. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 7.

THIS is the first occasion on which the reviewer has encountered this book and it must be admitted that its small size rather prejudiced him against it as it was felt that skin diseases could not be dealt with in such a small compass.

Perusal of the book, however, brought about a complete change of opinion because it was found that all the really essential knowledge for the general practitioner is contained in it. In addition to a large number of carefully selected photographs there are 16 coloured plates most of which are good, but in a certain number there is rather an excess of rose pink coloration in the lesions.

The arrangement is good and easily followed, this applies particularly to the chapter on toxic dermatoses in which the author has included dermatitis herpetiformis, erythema multiforme, etc., which in the reviewer's opinion is their correct place.

It is a book that can be strongly recommended to general practitioners as one that will supply them with the necessary information for treatment of any case that is not of sufficient severity to send at once to a dermatologist.

P. A. M.

THE SURGERY OF PAIN.—By René Leriche, M.D. (Lyon), LL.D. (Glas.), F.R.C.S. (Eng.) (Hon. Causa), etc. Translated and edited by A. Young, B.Sc., M.B., C.M., F.R.F.P.S.G., F.A.C.S. (Hon.), M.D., Strasbourg (Hon. Causa), etc. 1939. Baillière, Tindall and Cox, London. Pp. xix plus 512. Illustrated. Price, 21s.

It is needless to say that the appearance of a new volume by Professor Leriche may rightly be regarded as an event of outstanding importance in the medical world. There is added fascination in the fact that this book is entitled 'The Surgery of Pain' and of pain as the surgeon sees it. It will be generally agreed that no one is more eminently fitted than Professor Leriche to handle this difficult problem. It is a matter of gratification that the translation from the original French was carried out by no less an authority than Professor Young of Glasgow, to whom our best thanks are due.

The origin of this book is associated with the name of Professor Charles Nicolle, at whose invitation these lectures were delivered in connection with the Chair

of Medicine at the Collège de France at Paris. It may be recalled that Professor Nicolle succeeded to the chair, once occupied by Jaennec, Magendie, Claud Bernard, Brown Séquard and d'Arsonval. In this book Professor Leriche gives the complete dramatic story of the inception and development of the surgery of the sympathetic nervous system. There are altogether 14 chapters, covering such diverse and difficult subjects as 'pain-malady' trigeminal and facial neuralgias, causalgia, pains due to vaso-constriction, angina pectoris and inoperable malignant neoplasms. Pain is treated in this book, not as a symptom but as a disease—'pain-malady'. Such a view, of course, is revolutionary and is liable to be stoutly opposed by physiologists. Neither is the surgeon spared, a common type of facial neuralgia is designated as the 'syndrome of multiple needless operations'. It is refreshing to read that the surgeon's art 'does not as a rule long retain anything that is too strictly instrumental. For their proper use, instruments require their inventors'. It is explained that Raynaud's disease is brought about by hyper-excitability of the sympathetic. In the treatment of angina pectoris, one encounters the general therapeutic problem of arteritis and vaso-motor disturbances. One of the most fruitful contributions by Professor Leriche to surgical advance is the demonstration of the 'diagnostic value of the abolition of pain by regional novocainisation'. This is only one of the many notable features of his work.

This is, indeed, a book to possess and study.

P. N. R.

THE PHARMACOLOGY AND THERAPEUTICS OF THE MATERIA MEDICA.—By W. J. Dilling, M.B., Ch.B. (Aberd.), M.P.S. (Hon.). Fifteenth Edition. 1939. Cassell and Company, Limited, London. Pp. x plus 600. Price, 10s. 6d.

This book has gone through 15 editions and 23 reprintings; it has served two generations of medical students and doctors; and there seems every reason of predict that it will serve a third generation equally well.

The last edition was published six years ago so that many additions will be found in the present one. The *Addendum* to the B.P. was published in 1936, and all the new drugs that appeared in this are dealt with fully in this edition, through intelligent anticipation on the part of the author most of them had already been included in the 1933 edition.

A number of drugs that have not yet acquired pharmacopœial rank are included, such as nicotinic acid, mandelic acid, zinc protamine insulin, various hormones, the sulphanilamide group, and snake poisons.

The information given is for the most part concise and accurate. The author says, quite rightly, that quinine is not a perfect prophylactic in malaria but from the rest of the paragraph one gathers that he has not fully appreciated the difference between clinical prophylaxis and true causal prophylaxis.

It is a book that we can strongly recommend.

YOUR CHEST SHOULD BE FLAT: THE DEEP CHEST MAKES BETTER SOIL FOR TUBERCULOSIS.—By S. A. Welsman, M.D., F.A.C.P. 1938. J. B. Lippincott Company, Philadelphia and London. Pp. xvii plus 145. Illustrated. Price, 9s. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 6

The author, who is Assistant Professor of Medicine, University of Minnesota, has recorded his observations on several hundreds of normal and tuberculous chests and on 20,000 Minneapolis public school children. Besides the determination of the thoracic index (i.e., the ratio of the depth of the chest to its width), the length-width index, the length-depth index and the size of the subcostal angle, the vital capacity was measured.

The author refers to the popular and erroneous idea that the healthy chest is round and deep and the tuberculous chest flat. By a careful study on a significantly large number of cases from infancy onwards he has shown that the opposite is true, namely, the

tuberculous chest is round and deep, while the normal chest is flat and wide with an index between 60 to 70 per cent. The infantile chest is round but in healthy individuals it gradually flattens up with age owing to various factors. The chests which do not flatten with age have been shown to be more prone to disease. The thoracic index has been found to be higher in tuberculous chests and still higher in chronic bronchitis and asthma.

It has been shown that the thoracic index falls in the case of boys from 72 at the age of 5 years to 67 at the age of 18, while in girls it ranges from 71 at the age of 5 years to 70.4 at the age of 18. Up to the age of puberty there is no very clear difference in the chest contours of the two sexes. After puberty, however, the boys' chests are flatter than those of girls of the same age. It decreases steadily in both sexes as height increases and also as vital capacity increases. It has further been shown that environment has a definite influence on chest development, children from good environments showing on average a much better type of development than children from poor environments.

From the data collected and analysed by the author, especially on tuberculin-tested individuals and on tuberculous patients, he thinks that the deep, narrow chest offers a more favourable soil for the development of tuberculosis than does the flat, wide chest. The following factors have been generally noticed in association with the deep chest:—weight and height below normal for age, poor socio-economic environment, lower than normal standing in school work and tendency to positive tuberculin test.

The author considers that the normal development of the chest and the early correction of physical defects are likely to be vitally important in preventing tuberculosis and emphasizes that, for early detection and correction, the tuberculin test and the chest measurements should be a routine procedure in the medical examination of children. Diet, environmental adjustments, suitable physical exercise and a periodic medical check-up for all children have been advised as some of the correctional procedures.

The author has devoted much time and labour to this subject. As the method does not require any elaborate equipment and complicated procedure, suitable indices may be found for each country and applied in preventive medicine. As the book is written in simple and non-technical language, doctors as well as educationists may peruse the book with great interest and profit. The printing and get-up do credit to the publishers.

A. C. U.

FORMULARY OF THE JUMNA DISPENSARIES, ALLAHABAD—BASED ON THE BRITISH PHARMACOPŒIA, 1932 AND SUPPLEMENT 1936. Compiled by the Staff. 1938. Published by Dr. D. N. Forman, Jumna Dispensaries, Allahabad. Pp. 138

The formulary of the Jumna Dispensaries, Allahabad, is based on the British Pharmacopœia 1932 and its supplement 1936. The book is divided into several sections and contains many valuable prescriptions used in different diseases. The appearance of the volume is good and there are footnotes and enough space for additional notes. It would have been better if the posological table (B. P. 1932) was also included in the book. The book will serve as an useful guide to medical men and hospitals.

M. N. R. C.

HISTOLOGICAL TECHNIQUE FOR INTRACRANIAL TUMOURS.—By Dorothy S. Russell, M.D. (Lond.). 1939. Oxford University Press, London. Pp. vii plus 71, with 6 plates. Price, 7s. 6d. Obtainable from Oxford University Press, Bombay and Calcutta

This is a book on pure technical methods. Differential staining in histological technique is a very important part in the study of histopathology and this is specially applicable in the case of brain tumours. But there must be caution in the application of these

special methods as pointed out by the writer, because of the many pitfalls the novice may encounter. The authoress is a well-known technician and she has done a great service to beginners by publishing this small volume so that they may not be misled. All the details including the handling of the specimens, fixation of tissues, methods of embedding, composition of reagents, etc., have been described. There is a welcome departure from previous books on technical methods, viz. the inclusion of photomicrographic plates, which will have wide appreciation.

This will be an extremely useful book and should certainly find a place in every histological laboratory.

B. P. T.

HANDBOOK OF SANITARY LAW FOR THE USE OF CANDIDATES FOR PUBLIC HEALTH QUALIFICATIONS.—By B. B. Ham, M.D., D.P.H. (Camb.). Twelfth Edition. 1938. H. K. Lewis and Company, Limited, London. Pp. xxi plus 355. Price, 7s. 6d.

This book has been regarded as a valuable compendium of sanitary law by the students qualifying for the D.P.H. in England.

Although the students preparing for the diploma in public health in this country read the Indian laws (provincial and municipal), they have to keep themselves informed of the current English laws as well. The book will serve that purpose admirably well, especially because all the latest English acts and orders have been incorporated in it.

A DESCRIPTIVE ATLAS OF RADIOGRAPHS: AN AID TO MODERN CLINICAL METHODS.—By A. P. Bertwistle, M.B., Ch.B., F.R.C.S.Ed. Fourth Edition. 1939. Henry Kimpton, London. Pp. xxxii plus 576, with 852 illustrations. Price, 42s.

It is just about three years ago that we had the pleasure of reviewing the third edition of this book whose object is to demonstrate to the clinician what great assistance properly taken radiographs can be in practically every department of their work.

The book is not the unaided work of the author, because in the beginning there is a long list of contributors who have helped him by supplying case records and pictures. The result of this is that the wide selection made available by the pooled results of many workers has led to the collection of practically perfect examples of the radiologists' art for all possible conditions.

The fourth edition is an improvement on the third because certain of the figures have been replaced by even better ones and there are nearly sixty more of them.

It is a very easy book from which to extract information because facing the illustrations there are brief notes giving the essential points of the history of the case from which the radiograph has been made, and a further aid is in many cases a small line drawing of the principal structures in the picture to serve as a reminder. But it must be admitted that most of

the figures are so clear that these line replicas are hardly necessary.

It is a useful and instructive book from which much may be learned by the easy and pleasing occupation of simply examining perfect reproductions of remarkably clear radiographs.

POCKET MEDICAL DICTIONARY.—By the late G. M. Gould, A.M., M.D. Eleventh Edition of over 40,000 Words. Revised by C. V. Brownlow. 1939. H. K. Lewis and Company, Limited, London. Pp. 1066. Price, 10s. 6d. Bound limp. With Thumb Index—12s. 6d.

A DICTIONARY of medical terms is essential to the students of medicine and Gould's *Pocket Medical Dictionary* is a well-known publication of proven worth.

This dictionary contains a vast amount of valuable information. There are over 40,000 terms used in medicine and the allied sciences. The appendix contains complete tables of arteries, nerves, muscles, chemical elements, hormones, micro-organisms, prefixes and suffixes, phobias, signs and symbols, etc., also dose lists of drugs and incompatibilities and a veterinary dose table, both in English and metric measures.

The reviewer would suggest that more attention should be paid to certain terms used in tropical medicine; e.g., the definition of kala-azar given in this book is 'An epidemic fever of Assam', which is obviously very unsatisfactory; and there is no mention of Napier's aldehyde test or Chopra's antimony test, though there are to be found, 'Froehde's reaction for proteids' and 'Justus's test'.

Terms like 'loculation syndrome' or 'Troin's syndrome', 'myocardosis' should have been included. The term 'nephrosis' has been defined as 'any kidney disease'.

These few deficiencies do not, however, rob the dictionary of its usefulness. The reviewer strongly recommends this book to medical students and practitioners.

OTHER BOOKS RECEIVED

Medical Practice in Residential Schools: A Manual for Medical Officers and Others.—By F. G. Hobson, D.S.O., D.M., F.R.C.P. 1938. Published by Oxford University Press, London and New York. Pp. xvi plus 284. Illustrated. Price, 10s. 6d. Obtainable from Oxford University Press, Bombay and Calcutta.

Uterus Masculinus: A Critical and Constructive Essay Concerning the Genitalia and Their Homologues.—By J. A. Leo Magee, M.B. Published by Messrs. H. K. Lewis and Company, Limited, London. 1939. Pp. 95. Price, 5s. 6d.

Play Therapy in Childhood.—By C. H. Rogerson, M.D. (Lond.), M.R.C.P., D.P.M. 1939. Published by Oxford University Press, London: Humphrey Milford. Pp. 64. Price, 3s. 6d. Obtainable from Oxford University Press, Bombay and Calcutta.

Essentialism. 1938. Published by Essentialism, Pollen House, Cork Street, London, W.1. Pp. 479. Price, 5s.

Abstracts from Reports

KING EDWARD VII MEMORIAL PASTEUR INSTITUTE AND MEDICAL RESEARCH INSTITUTE, SHILLONG. THE TWENTY-FIRST ANNUAL REPORT FOR THE YEAR ENDING 31ST DECEMBER, 1937

Antirabic section.—There has been no change in the method of preparation or the scheme of treatment. The use of Paris virus was continued during the year

and a carbolized 5 per cent sheep brain emulsion issued as the vaccine.

Treatment was carried out at Shillong and its centres and altogether 2,093 persons applied for treatment. Of these 1,806 completed the full course of treatment and 121 absconded before the completion of treatment. There were 163 advice cases who did not receive any treatment or discontinued treatment after two or three days because they were not at risk and treatment was considered unnecessary.

The following case has been included as a case of hydrophobia as the evidence on the whole seems to favour this diagnosis:—

Child aged 4 bitten on the head by a dog on 2nd July, 1937. Wounds cauterized with carbolic within two hours and patient given a full course of class IV antirabic treatment. On 29th September, 1937—nearly two and a half months after completion of treatment—developed hydrophobia and died on 8th October, 1937. The history as given by the physician attending the case was as follows:—

29th September, 1937.—Fever and loss of appetite.

4th October, 1937.—Slight spasm of the muscles of deglutition but able to drink water.

5th October, 1937.—Temperature 100.4, pulse 116. Restless; able to stand and walk.

7th October, 1937.—Temperature 100.2, pulse 116. No paralysis of limbs. Can swallow fluids.

8th October, 1937.—Temperature 97, pulse 140, vocal cords paralysed, right leg paralysed; retention of urine; can drink water. Died at 8-15 p.m.

The interesting features are:—

(1) The exceptionally long duration of illness—nearly 10 days from the initial onset of symptoms.

(2) The absence of convulsions and 'hydrophobia'—the patient was able to swallow fluids throughout her

The following is a summary of the activities of the society during the year 1937:—

1. *Staff*.—During the year the staff has numbered 36, including seven sub-assistant surgeons, Public Health Department, who had been deputed for one year's training in malariology.

2. *Training class*.—The annual eight weeks' course in malariology was held from 19th July to 18th September and was attended by 13 qualified medical men and one man who had previously received training in malariology. Of these, five were from the Public Health Department, five from tea estates and four private nominees. Eleven candidates passed the examination set at the end of the course.

3. *Malaria surveys*.—One new survey of a large *bhil* area adjacent to tea estates and a populous town previously surveyed has been undertaken during the year in order to determine the limitations of application of control measures.

Four tea estate surveys were completed during the year and recommendation for control measures submitted.

4. *Treatment schemes*.—The following table shows the results so far obtained in the Doom Dooma Cinchona-Plasmoquine Treatment Centre:—

OCTOBER–NOVEMBER–DECEMBER

Year	Number examined	Spleen		Number examined	Parasites	
		Number enlarged	Spleen rate		Number with parasites	Parasite rate
1	2	3	4	5	6	7
1932 ..	253	143	56.5	277	113	40.7
1933 ..	195	106	54.3	195	34	17.4
1934 ..	178	27	14.6	178	12	6.7
1935 ..	359	48	14.1	339	49	14.4
1936 ..	263	55	20.9	263	108	41.0
1937 ..	466	68	14.6	466	63	13.5

illness and the sight or feel of fluids did not bring about spasms in the throat or general convulsions.

(3) The long incubation period for a class IV bite in a young child.

Vaccine section.—The total quantities of vaccines issued during the year were:—

1. Cholera vaccine .. 425,443½ c.c.
2. T.A.B. vaccine .. 7,316½ e.e.
3. Influenza vaccine .. 15,060 c.e.

Bacteriophage section.—The total issues during the year amounted to 401,884 doses. Of this 117,040 doses represent the free supply to Nowgong and Habiganj for the first three months of the year. The balance was supplied as follows:—

Government institutions in the province	99,840 doses
Tea gardens	97,396 "
Railways	5,296 "
Missions	1,776 "
Private persons and institutions	29,184 "
Municipalities and local boards	26,592 "
Other governments ..	24,760 "

This year we have issued 587,436 doses less than in 1936 and the difference is due to the discontinuance of the free supply of bacteriophage to the experimental areas of Nowgong and Habiganj.

ASSAM MEDICAL RESEARCH SOCIETY

For the seventh year since its inception, the society has had a full year of activity. The activity of the workers has been confined to problems on the subject of malaria only, because of the limitation of funds made available by subscriptions.

The parasite rate shown for 1936 suggests that during a year of exceptionally high endemicity, infections are still being readily acquired in spite of the treatments given. The spleen rate, however, during 1936, remained comparatively low. Subsequently, in 1937, the spleen rate was again reduced to 1934-35 levels and in 1937 the parasite rate was also reduced to the level previously found.

Four groups of villages were selected for treatment of all malaria cases where parasites were demonstrable on blood examination, with reinforced cinchona febrifuge. The village treatment schemes were financed jointly by the Local Board concerned and the Government of Assam. Data collected on the efficacy of the treatment schemes will be presented.

5. *Entomological*.—Routine examinations carried out between 1st January and 31st December have included the identification of 140,733 anopheline larvae, 7,553 adults and 598 adult dissections.

6. *Blood examinations*.—During the year, 12,657 blood specimens have been examined and 3,519 or 27.8 per cent were found positive for malaria parasites.

7. *Experimental malaria control*.—In two groups of villages selected for experimental cold weather and pre-monsoon anti-larval control, it is still too early to give a significant evaluation of the efficacy or otherwise of the methods applied, which have been based on researches made by the society's workers but they suggest that in the Surma Valley villages the methods applied may prove to be efficacious when established over a significant period of years.

In the Brahmaputra Valley group, the indices indicate that the anticipated malaria control has so far failed.

The failure cannot, however, be attributed to the period of anti-larval control measures as the villagers, although they agreed in 1935-36 not to do so, cut a bund of the river in the cold weather 1936-37 which caused water to flow over approximately 370 acres of rice land thus making adequate economic malaria control an impossibility.

8. *Researches*.—Experiments on the efficacy of Pyrocid 20 as an insecticide were carried out by using Pyrocid 20 in kerosene in dilutions of 1-40, 1-35, 1-30, 1-25 and 1-20 in rooms of 1,500 cubic feet capacity using $\frac{1}{2}$ oz. of the dilution per experiment. Five experiments were made with each dilution where 100 adult anophelines (*A. maculatus* and *A. annularis*) were liberated prior to spraying with the diluted Pyrocid 20. Results were tabulated 20 minutes after exposure to the vapour in terms of numbers of anophelines dead and numbers stupefied. To determine whether those only stupefied after 20 minutes' exposure would recover, they were examined again after 24 hours when, without exception they were found to have died.

9. *Provincial malaria control*.—In co-operation with the Public Health Department and the Provincial Advisory Malaria Committee, supervision and recommendations have been given for nineteen anti-larval and five treatment schemes where surveys have been completed by the society.

CHOLERA ENQUIRY UNDER THE INDIAN RESEARCH FUND ASSOCIATION

Following the recommendation of the Cholera Advisory Committee of the Indian Research Fund Association the Field Unit at Habiganj was closed on 31st March, 1937, and the work of the enquiry has since been chiefly directed to basic laboratory research at the Pasteur Institute, Shillong.

These researches although of great interest and value are of too highly technical character for inclusion in this abstract so those interested are referred to the original report.—Eaton, I. M. G.

REPORT OF THE HAFKINE INSTITUTE, BOMBAY, FOR THE YEAR 1937. BY LIEUT.-COLONEL S. S. SOKHEY, I.M.S., DIRECTOR

GENERAL REVIEW

DURING the year under review (1937), the limited resources of the institute were almost entirely devoted to the routine production of large quantities of prophylactic vaccines. The institute produces Hafkine Plague Vaccine in large quantities to meet the needs of the whole of India, and prepares cholera, typhoid and antirabic vaccines for use in the Province of Bombay. In addition, the institute functions as the Provincial Bacteriological Laboratory and does a considerable amount of diagnostic work for the government hospitals. Though the institute has no resources of its own for conducting researches, important investigations in plague and pharmacological studies of synthetic anti-malarials were conducted with the generous aid of the Indian Research Fund Association. A number of voluntary workers also carried out a number of researches.

Plague vaccine.—In the case of broth vaccines, those incubated at 27°C. are more potent than those incubated at 37°C. While in the case of agar vaccines, those incubated at 37°C. are more potent than those incubated at 27°C. Killing of cultures by the application of heat at 55°C. for 15 minutes gives better vaccines than when the cultures are killed with phenol or formalin.

One new observation of some interest has emerged. As reported before, we had developed a method of rendering plague strains avirulent by repeatedly sub-culturing them on agar slopes at weekly intervals and incubating them at 37°C. By this method we had rendered avirulent strain 120/5H. The live avirulent vaccine used in our previous study was made from this strain and it proved to be possessed of very high protective value. During the year we rendered avirulent another strain, strain I, by the same method.

But the live avirulent vaccines prepared from this strain have proved to be almost entirely devoid of any protective power. This would seem to show that avirulent strains differ in their antigenic value. We propose to study this point more fully. The behaviour of avirulent strains in this respect should be compared with the behaviour of virulent strains. We have not noticed any measurable differences in the antigenic value of the large number of different virulent strains we have used in our work. If a suitable vaccine is made from a fully virulent strain it always seems to possess a very high protective power.

Anti-plague serum.—Production of the serum on the lines reported before was continued, but no opportunity arose during 1937 of testing the serum in the field. However, early in 1938, a small epidemic occurred at Bettiah, Bihar, and we were enabled to deal with 124 cases, and those treated with serum gave a percentage mortality of 27 and the controls a percentage mortality of 65; the patients were taken alternately for serum treatment and as controls without selection.

Epidemiology of plague.—An interesting fact has emerged from our studies which seems to have a bearing on the mechanism of pandemics of plague, how they come to an end and how they start again after the lapse of time. The Indian Plague Commission working in 1907, when plague was still raging in Bombay, found that rodents responsible for the spread of plague in the city were *Rattus rattus* and *Rattus norvegicus*, which formed over 99 per cent of the rat population. They found these species to be highly susceptible. They also found that *Gunomys varius* was not a common rodent in Bombay city and that it formed only 1 per cent of the rat population. We, working in 1937, find that *Rattus rattus* and *Rattus norvegicus* together form only about 70 per cent of the rat population and *Gunomys varius* accounts for the remaining 30 per cent. More interesting still, *Gunomys varius* is highly susceptible to plague infection while the other two species are now highly resistant, that is, the erstwhile agents of the spread of the disease have become resistant and are being replaced by a species which is highly susceptible.

DEPARTMENT OF PHARMACOLOGY

The department continued its investigations into the pharmacology of synthetic anti-malarials and its studies in acetylcholine. The previous observation that plasmoquine did not affect the course of pregnancy in any way was extended by the observation that the placenta acted as a filter and prevented the drug from getting into foetal circulation. By an ingenious technique it was shown that while toxic doses of the drug definitely affected the maternal heart, it showed no effect in the heart tracing of the foetal heart. The measurement of the concentration of the drug in the maternal blood stream and in the foetal circulation confirmed the above observation. Similar studies on the action of atabrin are also in progress.

Studies in acetylcholine have yielded further interesting facts. The rôle played by this substance in the transmission of nerve impulses at nerve ends in muscles is well known, but it was doubtful whether it played a similar rôle in the central nervous system at the ends of the afferent nerves. Dr. Dikshit has been able to obtain some experimental evidence that acetylcholine is liberated in the central nervous system when afferent nerves are stimulated.

With a further generous grant from the Indian Research Fund Association the department was strengthened by the employment of a highly trained research chemist, Dr. B. K. Nandi, who has facilitated the pharmacological studies of plasmoquine by developing a new test for quantitative and qualitative estimation of the drug in tissues. Two voluntary research workers Dr. H. S. Mahal and Miss K. Bhagvat made studies in choline esterase and developed an enzyme method for the estimation of adrenaline.

This department is still entirely maintained by the Indian Research Fund Association and is engaged primarily in researches on synthetic anti-malarial drugs,

but it is hoped Government will take over the department and strengthen it to enable the department to take up work in connection with the control of the sale of drugs in the Province.

BIOCHEMICAL DEPARTMENT

The department besides its routine work continued work on establishing normal clinical standards for Indians. For establishing red cell and hæmoglobin standards for normal Indian men and women 121 men and 101 women between the ages of 18 and 30 years have been examined. Hæmoglobin determinations were made by Van Slyke oxygen capacity method, a method which yields very accurate results. An average of 15.37 gm. of hæmoglobin per 100 c.c. of blood for men and an average of 12.99 gm. for women were obtained. Contrary to all expectation these averages tallied exactly with similar hæmoglobin averages worked out in America for American subjects in spite of the dissimilar dietetic and climatic conditions of Indian and American subjects. This observation points to the possibility of there being a physiological constant for hæmoglobin. The subject is being studied.

TRIENNIAL REPORT ON THE WORKING OF THE CIVIL HOSPITALS AND DISPENSARIES IN THE MADRAS PRESIDENCY FOR THE YEARS 1935 TO 1937

At the commencement of the triennium, there were 1,356 medical institutions of all classes in this Presidency as against 1,283 at the end of the triennium, i.e., 31st December, 1937. The decrease is mainly due to a number of medical institutions having been transferred to the new Orissa Province.

The number of in-door patients treated during the year 1937 was 280,150 as compared to 255,358 in 1936 and 245,590 in 1935.

The total number of out-door patients treated in all the hospitals and dispensaries in the Presidency during the year 1937 was 17,179,284 (7,960,550 males and 4,341,961 females and 4,876,773 children) as compared to 16,032,812 (7,482,765 males, 4,022,425 females and 4,527,622 children) in 1936 and 16,570,958 (7,788,602 males, 4,015,155 females and 4,767,201 children) in 1935.

The daily average number of in-patients treated during the year 1937 was 12,917.20 as compared to 11,656.03 in 1936 and 11,244.20 in 1935. The daily average number of out-door patients treated in the medical institutions during the year 1937 was 123,625.88 as against 109,226.04 in 1936 and 112,479.96 in 1935. The increase in the daily average number of in- and out-patients apparently indicates the popularity of the allopathic medical institutions.

Among the various diseases treated in all classes of hospitals and dispensaries, those that accounted for the largest number are shown below:—

Diseases of the digestive system (excluding diarrhoea, dysentery and tumours)	2,415,375
Diseases of the eye	1,545,527
Diseases of the respiratory system except pneumonia and tuberculosis of the lungs	1,380,494
Ulcerative inflammation	1,343,753
Diseases of the ear	1,196,685
Injuries (local and general)	1,191,752

The Rural Medical Relief Scheme which was inaugurated in this Presidency in the year 1925 continued to work with success during the triennium under report. During the earlier part of the triennium, Government could not give effect to the opening of a number of new rural dispensaries due to financial stringency. As the conditions improved, their opening and operation were sanctioned by Government in the last quarter of the year 1937. There were 428 rural dispensaries in this Presidency at the close of the year 1935, 397 at

the close of the year 1936 and only 404 at the close of the year 1937.

With a view to widen the scope of the maternity relief work and to enable the rural population to avail themselves of the services of trained and qualified midwives for labour cases in a large measure, Government have undertaken to meet the subsidy paid to the midwives, from the provincial funds and enhanced the provision for appointments of increased number of midwives in rural areas. The Rural Medical Relief Scheme having taken strong root and its value having become recognized by the rural population, the usefulness and the popularity of the scheme are bound to increase in a wider scale in future.

Malaria.—The total number of patients treated for malaria during the year 1937 was 1,107,937 with 297 deaths as compared to 999,612 with 230 deaths in 1936 and 1,069,669 with 268 deaths in 1935.

Dysentery.—The number of cases of both amœbic and bacillary dysentery treated during the year 1937 was 317,568 with 655 deaths as against 302,632 with 545 deaths in 1936 and 302,077 with 531 deaths in 1935.

Kala-azar.—The number of patients treated in 1937 was 2,517 with 19 deaths as compared to 1,919 with 13 deaths in 1936 and 2,130 with 13 deaths in 1935.

Enteric fever.—Twenty-two thousand seven hundred and seventy-three patients were treated in the year 1937 with 719 deaths whereas the number of patients treated in 1936 was 21,919 with 588 deaths and in 1935, 20,856 with 577 deaths.

Labour cases.—One hundred and twenty thousand seven hundred and nineteen labour cases were conducted during the year 1937 in all classes of medical institutions of which 100,779 were normal and 19,940 abnormal. The corresponding figures for 1936 and 1935 were 104,171 (88,916 normal and 15,255 abnormal) and 106,823 (90,910 normal and 15,913 abnormal), respectively.

Tuberculosis.—The total number of patients treated in the Tuberculosis Institute, Egmore, in the year 1937 was 11,985, the daily average attendance being 213.37. The Tuberculosis Clinic opened in the Victoria Caste and Gosha Hospital, Triplicane, during the year 1935 continued to work during the whole of 1937. The lady assistant surgeon of the institute was deputed to work in the clinic thrice a week. The total number of patients treated in this clinic during 1937 was 319, the daily average attendance being 11.10. The patients requiring treatment in the Tuberculosis Institute were put on a waiting list and it was frequently found necessary to give some active treatment to some of the cases who were waiting for admission into the hospital so induction of initial A.P. was commenced with five beds from June 1937. The Tuberculosis Clinic of the King George V Anti-Tuberculosis Sub-Committee which has been located in the institute's premises has been doing work in contact collaboration with the institute and rendered valuable service.

The total number of patients treated in the Tuberculosis Hospital, Royapetta, Madras, during the year 1937 was 733 as compared with 914 in 1936. The decrease was due to one of the male wards having been occupied by the Public Works Department for over two months in connection with certain special repairs.

The Tuberculosis Sanatorium at Tambaram which was taken over by Government in 1937 commenced to work under this department from 12th April, 1937, with an accommodation for 40 patients. One hundred and two cases were admitted during the year of which 62 were discharged and 40 remained at the close of the year.

Leprosy.—The leprosy work during the triennium under report made steady progress. The leprosy campaign which owes its rapid progress to the support of Government was also taken up by local boards and the public. Non-official organizations were formed to further the campaign and appeals to the public for funds were well responded to. The number of clinics opened, the total attendance and the number of cases

treated during the triennium under report were as follows:—

Year	Number of clinics	Total attendance	New admissions
1935 ..	440	808,746	37,399
1936 ..	446	788,396	33,097
1937 ..	445	777,188	33,038

About 20 clinics were transferred to Orissa Province during 1936.

Medical education.—The medical education in the colleges and schools continued to be efficient during the triennium and the percentage of passes was satisfactory. In Madras a physical director was appointed for both the Medical College and the Stanley Medical School. He is also looking after the games and other activities of the sports of these institutions. Special tutorial classes for coaching the students for final F.R.C.S. Examination were held in the Madras Medical College in 1937.

Honorary medical officers.—Applications were invited for appointment of honorary medical officers during 1937 and suitable candidates were appointed in the hospitals where their services were required. The response from women medical practitioners to take up honorary posts was, however, very poor. Under the reorganization scheme for appointment of honorary medical officers in the place of paid officers, the former will be paid a graded honorarium from Rs. 20 to Rs. 100 per mensem in both the teaching and general cadres and the tenure of such honorary officers will be limited to five years.

Nurses and midwives.—The reorganization of the nursing service in this Presidency and the introduction of male nursing service is under consideration of Government. There is a great need for the development of the nurses' and midwives' profession though this Presidency may be said to have advanced in this respect much more than most of the other provinces in India. The appointments of nurses in many of the hospitals in the mofussil are inadequate and the need for additional staff is being keenly felt. The course of training of nurses for midwives has been extended from one year to 18 months. The proper training of nurses is handicapped for want of sister tutors although a large number of candidates who are educationally qualified are seeking admission in the training schools for nurses.

A REPORT OF THE SIXTY-FOURTH YEAR'S WORK IN INDIA AND BURMA OF THE MISSION TO LEPERS. SEPTEMBER 1937 TO AUGUST 1938

The main statistics for 1937 are as follows: On 31st December, 1937, there were 7,544 patients resident in the mission's homes in India and Burma; there were also 813 healthy children of lepers, for whom the mission was providing either homes, or means for their separate care. In addition there were 2,030 patients and 152 healthy children in other homes, not belonging to the mission, to which substantial financial aid was given. A total of 10,590 men, women, and children were therefore securing the benefits of the mission's ministry. And in addition an almost equal number of out-patients suffering from leprosy—10,444—were receiving medical treatment. So that the mission's activities reached in one way or another over 20,000 people. On the financial side the total expenditure in 1937 was Rs. 8,12,209. This was made up of Rs. 4,35,646 received from contributions and Rs. 3,76,563 from Government or Local Board grants. Of the private contributions for the maintenance of the work it is well

to remember that, deeply grateful as we are for those received from friends in India, the great majority of such funds come from distant countries. We recognize, of course, that the grants from public sources represent, if in an indirect way, the contributions of the people of India and Burma, and for this substantial help we express our appreciation. We are also particularly grateful for substantial funds given for building purposes from sources in India.

There has been the fiftieth anniversary of the establishment of the mission's largest home, Purulia, with over 800 patients resident to-day. During its fifty years of ever-growing service over 13,000 lepers have found shelter and friendship there. At Purulia the first home in India for the healthy children of lepers was built; Purulia was one of the first homes to engage in organized out-patient clinic work (and there is now a weekly attendance of over 400). In many ways this home has been in the vanguard of advance. And we would pay a special tribute to the present superintendent, the Rev. E. B. Sharpe, who for the last seventeen years has with such devotion given himself to the work.

This year, another home, hospital and clinic has been built and opened at Zamuradganj just outside Fyzabad.

At the formal opening in August of this year, the speech of His Excellency Sir Maurice Hallett, at that time Governor of the United Provinces, reveals something of the progress which has been made in knowledge and outlook since the early days of the mission, and indicates the conditions under which new work may begin to-day, as compared with fifty years ago:

'The history of the care and treatment of leprosy contains many pages filled with surpassing heroism and self-sacrifice. It is only however of very recent years that medical science has been able to hold out any hope of cure to those infected with this disease, or any means of checking it from spreading, other than by the method of segregation. Those infected were previously condemned to a life-long isolation from their uncontaminated relatives and friends, and to the prospect of prolonged and inevitable suffering. Modern medical science has many great achievements to its credit and one which has been accomplished by the patient efforts of large numbers of workers has been to demonstrate that the disease is not incurable if it is treated by certain new methods in the earlier stages. The disease can, therefore, be controlled not merely by the defensive method of segregation but by the offensive method of early diagnosis and treatment; and fresh hope is given of ultimate success in banishing it from India as it has been banished from the Western world. The time when that may be possible is no doubt still far distant, but the creation of centres such as this will bring it nearer and make possible the early treatment of sufferers. The experience gained at institutions such as this will do much to increase the knowledge of our medical experts and they will, I am confident, be able to discover further preventive and curative measures which will be of the greatest benefit to humanity. The cause is one which cannot but claim our sympathy, and our gratitude to those who have helped to create this institution.'

It is also a matter for encouragement that whereas fifty years ago fresh schemes awaited the generosity of friends abroad, the initiative and funds for fresh work is now more frequently coming from within India.

In actual methods of treatment there have been no special developments. But the fact that increasing numbers of homes are being asked to allow Government or Local Board medical officers to undergo special training in them emphasizes the growing attention which is being given to the disease by health authorities. Results of treatment have not been spectacular, but the figure of 768 patients, in whom the disease has been arrested before deformity has begun, forbids us to be discouraged and challenges us to renewed effort.

STATISTICS OF TREATMENT, 1937

In-patients

Inmates under treatment at end of year ..	7,432
Inmates who received treatment for three months and upwards	9,549
Much improved	2,520
Slightly improved	2,605
Became worse	588
Had to stop treatment	162
Apparently stationary	1,045
Died or left	1,480
Cases arrested <i>without deformity</i> ..	768
Cases discharged <i>without deformity</i> ..	554
Cases arrested <i>with deformity</i> ..	381
Cases discharged <i>with deformity</i> ..	122
Cases arrested in a previous year but relapsed during the year	58

Out-patients

Number of out-patients treated ..	10,444
Cases improved	1,417
Cases arrested or became symptom-free ..	230

Correspondence

CHRONIC SNAKE-BITE

To the Editor, THE INDIAN MEDICAL GAZETTE

Sir,—I had often heard of persons bitten by a snake getting the habit of being bitten again and again, but I never believed it, till the following case came under my personal observation, which I think will be of some interest to your readers:—

P. L., aged about 28 years, a relative who is working as a compounder with me and lives in my house, was bitten by a snake in July 1937. He was again bitten in June 1938; the snakes were killed by him in both of these instances, on the spot. Then, a snake started biting him every month, and the time of biting was four or five days before or after the full moon. It is biting him still at regular intervals. The house in which he lives is a brick building of two storeys with brick floors on the lower storey and cement floors in the upper storey. He was made to sleep in the upper storey, but was bitten in spite of these precautions.

I have twice seen the snake coming to bite him alarmed by the house dog who intercepted the snake by his furious barking. In one instance the snake was killed by me, but the patient was bitten the day following at a village four miles away where he had gone to see a patient.

The only effect of the bite is the passing of bloody urine and shooting pains along the whole length of his spine for about four days.

He has gone to different places to consult native experts reputed to be curers and has even crushed the head of a live snake between his teeth, which was advised as the best antidote for future bites, but all in vain.

These repeated bitings and the perpetual fear of being bitten is having psychological effects on his general health by now.

I must earnestly request that you will kindly help me in recommending any treatment for this complaint. I have never come across any literature on this subject anywhere up to now.

In case nothing is known to present-day medical science, I would suggest that you will give publicity to this to get views of your readers.

Yours, etc.,

ISHAR DAS, M.P.L.

c/o PREM MEDICAL HALL,
KILA SOBHA SINGH,
DISTRICT SIALKOTE,
PUNJAB,
25th February, 1939.

[Note.—We invite opinions, including those of psychologists.—EDITOR, I. M. G.]

MARKED WASTING AND RETARDATION OF DEVELOPMENT RESULTING FROM LACK OF ESSENTIAL AMINO ACIDS IN THE DIET

To the Editor, THE INDIAN MEDICAL GAZETTE

Sir,—From time to time I get cases in the Out-Patient Department of the Bai Jerbai Wadia Hospital for Children, Bombay, some of which have been referred to me by the doctors for the treatment of paralysis. All the children that I have so far seen have been between the ages of 2 to 5 years. There has been an invariable history of the child never having yet learnt to walk. I have so far seen twenty such cases, 15 of whom have been derived from the Gujarati Hindu community, one South Indian child, and four Parsee children. A few of these could not even sit, whereas four had learnt to stand a little before they came up for examination.

All these children have been very thin and relatively dwarfed for their age. They are also slightly anæmic. The most outstanding feature, however, is the profound hypotonia, which, with the extreme thinness of the limbs, leads the unwary clinician to diagnose the condition as one of infantile paralysis. This extreme hypotonia allows exaggerated movements at the joints, and in those who can stand, the limbs sag inwards and backwards, producing a considerable degree of genu-valgum or genu-recurvatum or both. The feet collapse under the weight and assume an extreme valgus position, the child actually standing on the inner borders of the feet. If the child has been standing for some time, the feet develop a fixed valgus deformity and small wonder then, that, under such circumstances, one is beguiled into diagnosing the condition as one of polio-paralysis.

Patient examination of each individual muscle however shows that power is still present in each one of them and that the child is only weak, not paralytic. Radiological examination shows a marked degree of decalcification and thinning of bones with mild grade of rachitic changes at their ends.

All these cases occurred in families extremely poor. They were obviously cases of nutritional deficiencies, especially inadequacy of essential amino-acids, such as glycine, tyrosine, tryptophane, and cysteine. They are not cases really of paralysis or paresis for:

- (a) the condition is always bilateral and symmetrical,
- (b) some power is still present in all the muscles and
- (c) complete cure is always obtained by supplying the necessary ingredients lacking in the diet.

They are all due to lack of essential amino-acids in the diet for:

- (1) it is well known that these acids are absolutely essential, alike for our growth and for existence,
- (2) our body cannot evolve them and depends for their supply on ingested proteins, especially animal-proteins, which almost alone are what the physiologists term 'adequate proteins',
- (3) sixteen out of twenty cases occurred in Hindus, who, besides being strict vegetarians, were so poor that they could not even provide themselves with adequate supply of milk,
- (4) in the somewhat similar condition of muscular dystrophies, exhibition of glycine brings about a definite improvement, though, of course, it is temporary, and
- (5) finally, administration of these amino-acids in the form of an elegant preparation 'Novo-tropon' brings about a complete cure in every one of these cases.

I treated my first two cases by advising mixed diet or more liberal use of milk coupled with Calcipot-D (Torponwerke-Cologne). It was at this stage that I came to know about 'Novo-tropon' (Troponwerke-Cologne) and that it contained the amino-acids, as one of its chief ingredients. I started prescribing it along with Calcipot-D, for similar cases that came up to me later on, and I must admit, it has yielded results beyond my expectations. The rapidity with which the patients improve is very gratifying. In about a month's

time all the skin-folds fill out, the anæmia clears up and the child walks independently and usually with confidence.

The existence of these cases in our midst and the rapidity with which they improve with Novo-tropon brings home to us the dire necessity for a nation-wide propaganda to abjure silly vegetarianism in favour of more sensible and certainly far more scientific mixed diets on Western lines. I presume that such cases exist in far greater number in urban than in rural areas, where the poor parents are likely to have access to purer milk supply for their children than in towns. In India, where strict vegetarianism is still almost a part of religion, for millions, the need for milk supply, adequate both in quantity and quality for the children of the poor, is of national importance.

To sum up, there is a group of cases which seem to form a clinical entity by themselves.

These are children, between the age of 2 to 5 years, who have not yet learnt to walk. They are slightly anæmic but markedly wasted and show a profound grade of hypotonia.

They are apt to be mistaken for cases of polioparalysis and so correct treatment is unfortunately delayed.

They are really due to lack of essential amino-acids through failure of a purely vegetarian diet to provide the necessary quantity of adequate proteins.

A change in national outlook towards our diet is very desirable and until such a change is brought about and gross poverty eradicated, the need for some such preparation as Novo-tropon will continuously arise.

Yours, etc.,

R. J. KATRAK, B.A., N.S.C. (Bom.),
M.Ch. Orth. (L'pool), F.R.C.S. (Eng.).

JER BUILDING,
OPP. CHARNI ROAD RLY. ST.,
QUEENS ROAD, BOMBAY,
15th August, 1938.

URTICARIA FOLLOWING PRONTOSIL RUBRUM TABLETS

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In connection with comments on a case report about 'urticaria following Prontosil Rubrum tablets' appearing in March 1939 issue of the *Indian Medical Gazette*, I wish to express the opinion that the time of appearance of urticaria depends mainly on the sensitiveness of the patient rather than the mode of administration of the drug. In a case of abortion recently treated by me, urticaria developed within 30 hours during which period 2 doses of 5 c.cm. each of the red solution had been injected intramuscularly. No further injection was given and the patient put on prontosil album orally, which was fully tolerated.

Yours, etc.,

HUKAM CHANDRA, M.B., B.S., F.C.M.S.,
Assistant Surgeon, In-charge.

CIVIL HOSPITAL,
MAILSI, DISTRICT MULTAN,
PUNJAB,
2nd April, 1939.

THE EFFECT OF M. & B. 693 ON PNEUMONIA TREATED IN CIVIL HOSPITAL, MERCARA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—During the last four months the pneumonia cases treated in this hospital have fallen into two groups, i.e., those who have come from coffee estates whose owners have agreed to pay for M. & B. 693 treatment, and those who have come from estates whose owners have not done so.

There were 18 cases in the former group who received M. & B. 693. Of these three died giving a

mortality rate of 17 per cent. Two of the cases who died were moribund when admitted and the M. & B. 693 could not have had time to take effect. This leaves only one case which died in spite of adequate treatment with M. & B. 693. This gives a mortality rate of 1 in 16, i.e., 6 per cent.

Of the 37 cases who did not receive M. & B. 693, 15 died which gives a mortality rate of 41 per cent which is usual for this hospital where pneumonia is almost invariably complicated by chronic malaria and hookworm.

There was no difference in the type of patient in the two groups and there was no difference in the line of treatment given apart from the addition of M. & B. 693.

It thus appears that the addition of M. & B. 693 to the treatment of pneumonia in this hospital reduced the mortality rate from 41 per cent to 6 per cent.

Yours, etc.,

G. P. CHARLEWOOD,
CAPTAIN, I.M.S.,
Civil Surgeon.

COORO,
'MERCARA',
7th April, 1939.

CHRONIC ULCERATIVE COLITIS

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I have gone through the able article on 'Chronic ulcerative colitis' by Colonel Chopra and Dr. Roy published in the *Indian Medical Gazette* of February 1939 with interest. I agree with all that has been stated therein. But I miss very much the mention in it of 'Bale' fruits as an adjunct to treatment although 'Isabgul' has justifiably been mentioned. 'Bale' renders the stool formed and gives that sensation of ease and satisfaction after passing it which is a very welcome factor in these patients who suffer from the oppressive feeling of never being able to empty their bowels completely.

During the season the pulp of the ripe fruit is eaten as it is or mixed with a little sugar to taste, or as 'Sharbat' preferably on empty stomach in the morning or in the late afternoon. When not yet ripe the green fruit (middle-aged) is cracked, burnt over the fire to the extent that the hard shell is charred and rendered brittle and the pulp is then scooped out, mixed with a little sugar, and eaten. But 'Bale' fruit, ripe or green, is not obtainable throughout the year. Therefore in order to provide against the off-seasons of the year my patients make and preserve for themselves thin slices of green fruits in quantity. The middle-aged fruit is chosen. Its hard outer shell is shaved off, the core is then cut in round discs of about one-fourth inch in thickness, dried carefully in the sun and stored for future use. A few of these, according to necessity, are boiled in water and the softened discs are smashed up with a little sugar and eaten.

In my experience there is another point in favour of 'Bale'. In a few cases I have noticed colitis alternating with naso-pharyngeal catarrh or bronchitis. The cycle is somewhat like this a few days of colitis followed by a few days of catarrh or bronchitis. 'Bale' in addition to relieving colitis renders catarrh or bronchitis less liable to return, at least in the usual frequency, that is to say, the remissions are longer.

Yours, etc.,

S. C. SEN,
Civil Surgeon.

RAJSHAH, I,
27th March, 1939.

[We have shown the above letter to Colonel Chopra who makes the following comments:—

"Our experience is that neither 'Isabgul' (*Plantago ovata*) nor Baël fruit (*Aegie marmelos*) do much good in chronic ulcerative colitis. The writer evidently has in his mind chronic dysentery of amoebic or bacillary origin."—EDITOR, I. M. G.]

Service Notes

APPOINTMENTS AND TRANSFERS

Colonel H. J. M. CURSETJEE, D.S.O., to be Officiating A. D. M. S., Western Independent District. Dated 15th April, 1939.

Colonel E. G. Kennedy reverted to military employ, with effect from the 20th April, 1939.

Brevet-Colonel B. C. Ashton to be Officiating O. C., C. I. M. H., Dehra Dun. Dated 12th March, 1939.

Lieutenant-Colonel R. H. Malone, Pathologist, Rangoon General Hospital, on proceeding on leave, made over and Lieutenant-Colonel G. C. Maitra, Director, Pasteur Institute, Rangoon, received charge of the duties of Pathologist, Rangoon General Hospital, on the afternoon of the 31st March, 1939, in addition to his own duties.

Lieutenant-Colonel J. G. McCann to be O. C., I. M. H., Shillong. Dated 18th March, 1939.

Lieutenant-Colonel J. E. Amsley to be Officiating O. C., I. M. H., Karachi. Dated 4th March, 1939.

Lieutenant-Colonel S. M. A. Faruki to be Officiating O. C., I. M. H., Rawalpindi. Dated 5th March, 1939.

Lieutenant-Colonel B. Z. Shah returned from leave and has been appointed Civil Surgeon, Belgaum, with effect from the forenoon of 26th March, 1939, *vice* Captain A. A. Pular, transferred.

Lieutenant-Colonel J. C. Pyper, O.B.E., an Agency Surgeon, is posted as Residency Surgeon, Hyderabad, with effect from the forenoon of the 29th March, 1939.

Major R. McRobert received charge of the duties of Medical Superintendent, Rangoon Dufferin Hospital, on the afternoon of the 6th April, 1939, from Lieutenant-Colonel M. L. Treston.

Lieutenant-Colonel A. Ba Thaw, on relief, resumed charge as Assistant Inspector-General of Civil Hospitals, Burma, on the 26th April, 1939, forenoon.

Lieutenant-Colonel R. H. Candy, C.I.E., whose services were placed at the disposal of the Government of Burma from 21st April, 1939, assumed charge of the duties of Inspector-General of Civil Hospitals, Burma, *vice* Lieutenant-Colonel A. Ba Thaw, on the forenoon of the 26th April, 1939.

Lieutenant-Colonel J. M. Mitchell, O.B.E., to be Officiating A. D. M. S., Kohat District. Dated 21st April, 1939.

Lieutenant-Colonel B. S. Dhondy to be O. C., I. M. H., Lucknow. Dated 14th April, 1939.

Lieutenant-Colonel H. S. G. Haji, M.C., to be Officiating O. C., I. M. H., Secunderabad. Dated 1st April, 1939.

Lieutenant-Colonel F. Phelan to be O. C., I. M. H., Poona. Dated 14th April, 1939.

Lieutenant-Colonel J. W. F. Albuquerque to be O. C., I. M. H., Thal. Dated 17th April, 1939.

Lieutenant-Colonel N. S. Jatar, C.I.E., D.S.O., Inspector-General of Prisons, C. P. and Berar, has been appointed to officiate as Inspector-General of Civil Hospitals, C. P. and Berar, in addition to his own duties from 24th April, 1939.

The Governor is pleased to appoint Lieutenant-Colonel K. S. Thakur, now on leave *ex-India*, to act as Surgeon-General with the Government of Bengal in the leave vacancy of Major-General Mills, with effect from the date on which he takes over charge from Lieutenant-Colonel T. C. Boyd, now officiating as Surgeon-General.

Lieutenant-Colonel H. E. Murray, Surgeon Superintendent, Presidency General Hospital, Calcutta, on relief, is appointed to act as Professor of Midwifery, Medical College, Calcutta, *vice* Lieutenant-Colonel P. F. Gow, or until further orders.

The services of Lieutenant-Colonel B. P. Baliga, Superintendent, Dum Dum Central Jail, are replaced at the disposal of the Government of India, Defence Department, with effect from the 20th June, 1939, or any subsequent date on which he may be relieved.

Major F. H. Whyte is appointed to the post of Civil Surgeon, Simla West, with effect from the forenoon of the 21st April, 1939.

Major B. D. Khurana to be D. A. D. H., Rawalpindi District. Dated 2nd March, 1939.

Major C. Mani to be Officiating D. A. D. H., Bombay District. Dated 13th March, 1939.

Major A. Tait to be O. C., C. I. M. H., Manzai. Dated 10th March, 1939.

Major T. A. Malone to be O. C., I. M. H., Aurangabad. Dated 13th March, 1939.

Major T. B. Pahlajani to be Officiating D. A. D. M. S., Waziristan District. Dated 6th February, 1939.

Major M. H. Wace to be O. C., Labour Camp Hospital, Quetta. Dated 17th March, 1939.

Major M. H. Shah, Additional Civil Surgeon, Delhi, is appointed temporarily to officiate as Chief Medical Officer, Delhi, with effect from the date he assumes charge of the duties, *vice* Lieutenant-Colonel R. H. Candy, C.I.E., transferred to Burma.

Major J. H. Gorman was attached to the Port Health Department, Calcutta, from the 10th to the 20th March, 1939, and is appointed to officiate as Port Health Officer, Calcutta, from the 21st March, 1939, until further orders.

On transfer from Campbellpur, Major B. Temple-Raston assumed charge of the Office of Civil Surgeon, Murree, on the forenoon of the 18th April, 1939.

Major G. Milne, an Officiating Agency Surgeon, is posted as Residency Surgeon, Kashmir, with effect from the afternoon of the 1st April, 1939.

Major C. Mani to be D. A. D. H., Bombay District. Dated 22nd April, 1939.

Major D. N. Chakravarti to be O. C., I. M. H., Allahabad. Dated 6th April, 1939.

Major C. A. Bozman, Director of Public Health, Burma, made over and Major T. J. Davidson received charge of the duties of the Director of Public Health, Burma, on the afternoon of the 20th April, 1939.

Major H. S. Waters has been appointed as Civil Surgeon and Superintendent, B. J. Medical School, Poona, with attached duties, with effect from the forenoon of 11th April, 1939, *vice* Lieutenant-Colonel F. R. Thornton, M.C., proceeded on leave.

Major G. B. W. Fisher made over charge of the Barisal Jail to Dr. G. De in the forenoon of the 1st April, 1939.

Major J. C. Drummond, Civil Surgeon, Darjeeling, is appointed to act as Surgeon Superintendent of the Presidency General Hospital, Calcutta, *vice* Lieutenant-Colonel H. E. Murray.

Major K. S. Fitch, Civil Surgeon, Burdwan, on relief, is posted to Darjeeling as Civil Surgeon, *vice* Major J. C. Drummond.

Captain T. F. O'Donnell was transferred to Civil employ in the United Provinces from 6th April, 1939.

Captain A. T. Andreasen was transferred to Civil employment in the United Provinces from the 14th April, 1939.

Captain F. C. Leach, Superintendent, Mental Hospital, Nagpur, has been appointed as Civil Surgeon and Superintendent, Robertson Medical School, Nagpur, in addition to his own duties from 11th April, 1939.

Captain J. H. Bowie to be Officer-in-Charge, Brigade Laboratory, Dehra Dun. Dated 6th April, 1939.

Captain W. A. Hopkins to be Specialist in Ear, Nose and Throat, Western Independent District. Dated 19th April, 1939.

Captain F. H. A. K. Davidson made over charge of the Jalpaiguri Jail to Babu Ajit Kumar Gupta in the afternoon of 28th February, 1939.

Captain G. C. Retz to be Officiating Officer-in-Charge, I. H. C. Records, Kirkee. Dated 25th March, 1939.

Captain R. C. Dracup to be Officer-in-Charge, Brigade Laboratory, Allahabad. Dated 20th March, 1939.

Captain A. A. Pullar has been appointed as Presidency Surgeon, Bombay, with attached duties, with effect from the forenoon of 3rd April, 1939, vice Major H. S. Waters, transferred.

Captain H. W. G. Staunton is appointed to officiate as an Agency Surgeon, with effect from the forenoon of the 1st April, 1939, and is posted as Agency Surgeon, Bundhelkand, with effect from the same date.

The undermentioned officers arrived Bombay on 14th February, 1939, per S. S. *Castalia* on first appointment:—

Lieutenant H. V. Morris.

Lieutenant L. D. B. Frost.

Lieutenant A. M. Mackenzie.

Lieutenant R. M. McCullough.

Lieutenant F. W. Snedden.

Lieutenant E. J. Somerset.

Lieutenant J. L. M. Whitbread.

Lieutenant A. N. Roy reported at I. M. H., Rawalpindi, on 20th March, 1939, for preliminary training, on being granted a short service commission in the Indian Medical Service.

LEAVE

The Governor is pleased to grant leave for 6 months to Major-General P. S. Mills, C.I.E., Surgeon-General with the Government of Bengal, with effect from the 24th March, 1939.

Colonel A. C. Munro, A. D. M. S., Western Independent District, proceeded on 5 months' combined leave *ex-India* from 3rd April, 1939.

Colonel W. L. Watson, O.B.E., A. D. M. S., Kohat District, proceeded on 2 months' privilege leave *ex-India*, pending retirement, from 21st April, 1939.

Colonel D. H. Rai, M.C., Inspector-General of Civil Hospitals, Central Provinces and Berar, is granted 4 months' leave from 24th April, 1939.

The previous notification regarding the grant of leave to Lieutenant-Colonel R. H. Candy, C.I.E., and the appointment of Major M. H. Shah to officiate for him are hereby cancelled.

Lieutenant-Colonel A. C. Macrae, O. C., C. I. M. H., Dehra Dun, proceeded on 8 months' combined leave *ex-India* from 17th March, 1939.

Lieutenant-Colonel R. F. D. MacGregor, M.C., an Agency Surgeon, is granted leave on average pay for 15 days combined with leave on half-average pay for 8 months and 22 days, with effect from the forenoon of the 29th March, 1939, pending retirement.

Lieutenant-Colonel R. H. Malone, Pathologist, Rangoon General Hospital, was granted leave for a total period of 6 months from 1st April, 1939.

Lieutenant-Colonel F. R. Thornton, M.C., has proceeded on leave on average pay for 3 months and 17 days from 11th April, 1939, to 27th July, 1939, followed by leave on half-average pay for 8 days from 28th July, 1939, to 4th August, 1939, preparatory to retirement from 5th August, 1939. He was permitted to prefix the Easter Holidays commencing on 7th April, 1939, to the leave.

Lieutenant-Colonel M. L. Treston, Medical Superintendent, Rangoon Dufferin Hospital, was granted leave on average pay for 2 months from the 7th April, 1939.

Lieutenant-Colonel R. Lee, O. C., I. M. H., Jubbulpore, proceeded on 8 months' combined leave *ex-India* from 17th April, 1939.

Lieutenant-Colonel N. K. Bal, District Medical Officer and Superintendent, District Headquarters Hospital, Trichinopoly, leave for 1 month and 14 days, with effect from 1st May, 1939, or date of relief whichever is later.

Lieutenant-Colonel M. M. Cruickshank, Senior Specialist in Surgery, Superintendent and Surgeon, Government General Hospital and Professor of Surgery, Medical College, Madras, leave out of India for a period of 4 months and 23 days, with effect from 8th May, 1939, or date of relief.

Lieutenant-Colonel P. F. Gow, Professor of Midwifery, Medical College, Calcutta, is granted leave for 3 months, with effect from the 10th May, 1939, or from any subsequent date on which he is relieved.

Major K. F. Alford, D. A. D. II., Bombay District, proceeded on 7½ months' combined leave in and *ex-India* from 13th March, 1939.

Major K. H. A. Gross, M.C., an Officiating Agency Surgeon, is granted leave for 2 months and 14 days, combined with furlough for 9 months and 16 days, under the military leave rules, with effect from the forenoon of the 1st April, 1939.

Major F. R. W. K. Allen, Civil Surgeon and Superintendent, Robertson Medical School, Nagpur, is granted 2 months and 20 days' leave from 11th April, 1939.

Major C. Bozman, Director of Public Health, Burma, was granted leave on average pay for 8 months from the 21st April, 1939.

Major B. Chandhuri, Senior Medical Officer, Port Blair, is granted leave on average pay up to 31st July, 1939 (inclusive), with effect from the date he is relieved of his duties, and his services are placed at the disposal of the Government of Bengal, with effect from 1st August, 1939, for employment in the Bengal Jail Department.

PROMOTION

Lieutenant-Colonels to be Colonels

H. J. M. Curseljee, D.S.O. Dated 1st December, 1938, with seniority from 1st January, 1934.

J. S. S. Martin. Dated 17th December, 1938, with seniority from 27th July, 1934.

Majors to be Lieutenant-Colonels

R. K. Tandon. Dated 15th March, 1939.

H. M. Strickland. Dated 22nd March, 1939.

The seniority of Captain A. H. Barzilay has been antedated as follows:—

Lieutenant. Dated 18th August, 1930.

Captain. Dated 18th August, 1933.

Lieutenants (on probation) to Captains (on probation)

M. D. Black. Dated 10th January, 1939, with seniority from 1st March, 1938.

G. J. H. Maud. Dated 10th January, 1939, with seniority from 1st March, 1938.

I. D. Sutherland. Dated 10th January, 1939, with seniority from 1st March, 1938.

J. J. Woodward. Dated 10th January, 1939, with seniority from 1st September, 1933.

S. H. Heard. Dated 10th January, 1939, with seniority from 1st September, 1938.

J. E. Ennis. Dated 10th January, 1939, with seniority from 1st September, 1938.

H. R. Loughran. Dated 10th January, 1939, with seniority from 17th October, 1938.

D. J. P. Spillane. Dated 18th April, 1939, with seniority from 18th January, 1939.

P. M. Kirkwood. Dated 12th February, 1939, with seniority from 12th February, 1939.

RETIREMENTS

Lieutenant-Colonel E. A. Penny, 5th March, 1939.

Lieutenant-Colonel R. E. Flowerdew, C.I.E., 16th April, 1939.

Lieutenant-Colonel L. S. Modi, 3rd May, 1939.

RELINQUISHMENTS

Major R. McRobert, Civil Surgeon, Prome, on transfer, relinquished charge of the duties of Civil Surgeon, on the forenoon of 1st April, 1939.

Major T. J. Davidson relinquished charge of the duties of the Civil Surgeon, Moulmein, on the afternoon of the 17th April, 1939.

Notes

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To the Editor, THE INDIAN MEDICAL GAZETTE

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Original Articles

A NOTE ON SOME CASES OF LATHYRISM IN A PUNJAB VILLAGE

By S. R. A. SHAH, K.S., M.A., B.S. (Punjab),

B.T.M. (L'pool), D.P.H. (Lond.)

District Medical Officer of Health, Sialkot

Introduction

IN October 1935, I received information that in the village of Nawan Kulla in Narowal *tehsil* the inhabitants had been stricken with a mysterious malady which had crippled them. The villagers attributed this to the curse of certain Sadhus who had been abused and turned away from the village by them. Suspicious of an outbreak of an unusual disease like infantile paralysis or scurvy, I left for the village. Soon after my arrival I was surrounded by a crowd of villagers many of whom had walked up to me with difficulty with a waddling gait and supported by long sticks. This type of disease is not known to have occurred in this part of the province before.

Circumstances of village Nawan Kulla

The village is situated some eight miles to the south-west of Narowal town and about two miles from Raya station on the North Western Railway. The Punjabi word *nawan* means new. It is so called because the village is of recent origin, about 15 years old, and is really an off-shoot of the older and bigger village Kulla from which it is separated by about a mile. Originally it was just a well with one or two huts close by. Certain poor families from Kulla gradually migrated to this place and thus a small village sprang up.

Nawan Kulla is situated in a low-lying area. Drainage of the high ground to the north and east of the village runs along the southern boundary of the village to join the Ravi river which is four miles from it. When the monsoon rains have been heavy the village gets surrounded by water on three sides.

The population of the village is 205, out of which 104 are Sikhs, 71 Muslims, 21 Christians and 9 Hindus. The 9 Hindus belong to one family of 'Kahars' who are engaged as water carriers. Out of the 9 families of Muslims, 5 are weavers, 3 carpenters and one potters.

The Sikhs are agriculturists. Their holdings are very small and they are extremely poor. The land is irrigated from wells, and where these do not exist they depend on rainfall for their cultivation. The soil is poor in quality. The chief 'Kharif' crops are rice and maize and 'Rabi' crops are wheat and a certain amount of pulses. A small amount of ghee and a little superfluous grain are exported and these constitute the only outside source of income. The Muslims are somewhat better off economically,

but the poverty of the village as a whole can be well judged from the fact that there is not a single *bania's* shop in the village.

As regards diet, the Muslims eat well and an occasional plate of meat or eggs provides some variety in the routine diet of wheat *roti* with *dāl*, whey or *sag*. The Christians also, on account of the nature of their avocation (labour), get some change in their food as they move from place to place in search of work. The Sikhs, being poor and more or less stationary in the village, sustain themselves on the monotonous diet of wheat *roti* taken with *dāl*, *sag*, boiled turnips or pickle. Rice is taken occasionally.

Clinical manifestations of the disease.—Enquiry elicited that the disease had made its appearance in the month of June and since then had steadily increased. At the time of enquiry 64 persons out of a population of 205 were seen in the various stages of the disease.

Onset.—In 34 cases premonitory symptoms such as attacks of nausea or vomiting after meals and diarrhoea manifested themselves for 5 to 14 days before the characteristic symptoms of the disease appeared. Two of these cases also gave a history of attacks of intermittent fever with rigors and sweating lasting for 5 or 6 days. In the remaining 30 cases the disease was reported to have come on suddenly, and often during the night. Persons who had gone to bed quite well awoke next morning feeling stiff in the legs.

A marked feature in a number of cases was the sensory symptoms in the affected limbs, which preceded or accompanied the paralytic symptoms. A tingling sensation appeared in the soles of the feet which soon spread to the legs. Analgesia, anaesthesia and formication were also present. Both legs were affected simultaneously.

Thus, it will be seen that the earliest symptoms varied from gastro-intestinal disturbances to sensory symptoms in the legs or spasticity of the legs.

General symptoms.—Within 10 days to a month of the onset, signs and symptoms of a spastic diplegia supervened. The influence of muscular tension was apparent in the gait of the patients. Early and slight cases were able to walk for a fairly long time but the movements of the legs were slow and laboured. The knees got slightly bent owing to over-action of the flexors and more weight was thrown on the toes than on the heels. For a month or so the spastic symptoms predominated over the parietic, the spastic gait then gradually changed to spastic-parietic, and a decrease in muscular power was complained of in addition to the stiffness. Paresis of the leg muscles varied from simple impairment of movement to more or less complete paralysis of the muscles of the legs. The flexor muscles were involved first as a rule. The patient could not, or only with difficulty, dorsiflex the foot. The muscles of the affected limbs

were hypertonic. Any attempt at movement, active or passive, gave rise to muscular contraction which sometimes was painful.

The superficial reflexes, epigastric and abdominal, were exaggerated in the early cases but were feeble or altogether absent in the old cases. The plantar reflex, so difficult to elicit in the horny soles of the villagers, was extensor in type in those in whom it could be elicited (Babinski's sign). Knee jerks were also exaggerated in all early cases, but tended to get sluggish as the disease advanced. Ankle clonus was elicited in 14 cases. The sphincters of the rectum and bladder were unaffected. There was no impairment of the functions of the cranial nerves and speech, sight and hearing were normal. There were no mental symptoms or psychic disturbances. Sexual potency was diminished in some but never lost. Bed sores were not seen.

The respiratory and circulatory systems showed no involvement. Urine analysis and microscopic examination of blood revealed nothing of interest. Wassermann reaction in the case of three patients who were sent to Mayo Hospital, Lahore, proved negative.

Notes on some cases

The following are brief notes on some cases :—

Case I.—(Fig. 1.) A Sikh female, aged 19 years. She was one of the earliest who developed the disease and was a bad case. The disease started with an acute tingling sensation in the soles of the feet which soon spread to the legs. Walking was troublesome on account of hyperaesthesia and analgesia of the soles of the feet. In a few days spastic symptoms developed in the legs which made walking still more difficult. Adduction of the thighs and flexion of the legs became so firm that any passive or active effort at straightening or separating the legs was accompanied by extreme pain. Weakness of the legs also appeared and gradually increased. At this stage tingling sensation appeared in the palms of hands also, but it was not as marked as that of the soles of the feet. Spasticity and paresis of the forearms also developed but to a much lesser extent than in the legs. Hyperkeratosis of the soles of the feet became evident a couple of months after the onset. Some hyperkeratosis of the palms of the hands was also evident later on.



Fig. 1.

Present condition.—Her gait is still spastic but she is able to do all her household work. The knee jerks are slightly exaggerated. There is no permanent shortening of any muscles.

Case II.—(Fig. 2.) A Sikh, aged 30 years. He was one of the earliest cases, and his condition was definitely the worst. The disease was ushered in by dyspepsia and vomiting on taking wheat chapatis. This was followed by the usual symptoms of the disease. The special feature was the acute involvement of the upper extremities which gave rise to wrist drop and 'main en griffe' which is well illustrated in the photograph.



Fig. 2.

Present condition.—The spasticity and weakness of the muscles is still considerable. He can manage to walk with the help of a stick, but with laboured steps. In spite of serious and prolonged illness there are hardly any trophic changes.

Sex distribution.—Out of 115 males and 90 females residing in the village, there were 38 males and 26 females affected with lathyrism, i.e., about 33 per cent of the male population and 28 per cent of the female population suffered.

Age distribution.—Out of the 64 cases that occurred, the following was the incidence rate per 100 by decennial age groups.

Age group	Population	Number of cases	Percentage affected
1-10 years ..	36	9	25
11-20 " ..	61	18	30
21-30 " ..	59	24	41
31-40 " ..	37	9	24
41-50 " ..	13	4	30

Racial distribution

Community	Population	NUMBER OF PERSONS AFFECTED		
		Total	Males	Females
Sikhs ..	104	59	35	24
Muslims ..	71	5	3	2
Christians ..	21	..	..	..
Hindus ..	9	..	..	..
TOTAL ..	205	64	38	26

It will be seen from the above table that the members of the Sikh community were the principal sufferers. Fifty-nine cases out of 64

occurred amongst them, and all advanced cases were Sikhs. The 5 cases that occurred amongst the Muslims were of a mild type.

Seasonal occurrence.—The distribution of cases according to the month of onset is given below :—

June	..	..	..	8
July	..	..	..	16
August	..	..	..	21
September	..	..	..	14
October	..	..	..	5

The disease started in June, was in full swing in July, August and September, and in October its progress was arrested with the institution of preventive and curative measures detailed elsewhere.

Diagnosis

The mode of onset and course of the disease, spastic paraplegia, characteristic gait, and improvement of cases on giving up the use of suspected articles of diet, led one to the conclusion that the disease was lathyrism. This diagnosis was later confirmed by Dr. A. B. Arora, Assistant Director of Public Health, Lahore.

Differential diagnosis

Beri-beri.—The disease resembles beri-beri (dry form) in certain respects and is likely to be mistaken for it. In fact, the multiple peripheral neuritis and the dyspeptic symptoms seen in some cases suggested beri-beri in the first instance, but on closer examination of aetiological factors and clinical manifestations important differences were noticed. Namely, the patients did not live chiefly on rice and did not use white wheaten flour, the muscles were not found wasted and flabby, and the typical cardiac symptoms were absent.

Ergotism (spasmodic type) is differentiated by the facts that rye is not used at all in this area, and vertigo, headache and epileptiform convulsions were absent. To make certain that cereals other than rye had not been attacked by the fungus *Claviceps purpurea* the flours derived from wheat and rice were tested for ergot by the simple test advocated by Bottger; viz, the sample is mixed with ether and a few crystals of oxalic acid added. It is then brought to the boil and allowed to become clear by standing. If the clear supernatant fluid shows a red tinge ergot is present.

Pellagra.—The characteristic skin eruption, sore mouth and the psychic disturbances in pellagra were absent.

Ætiology

The elucidation of the causal factor presented a certain amount of difficulty. *Lathyrus sativus*

(*matlar* or *khassari*), which is most commonly associated with the disease, is not grown or used in this area. The cereals grown and used by the villagers are :—wheat, maize, gram, *urad*, *mung* and rice.

Maize, *urad*, *mung* and rice are eaten sparingly and very small quantities of these were recovered from the houses. On my first visit to the village, the villagers were advised to give up the use of all old stocks of food grains and obtain fresh supplies from a distant village. They got rid of the old stocks by feeding cattle on them or giving them to me for purposes of examination, with the exception of wheat, of which they had considerable quantities and were loath to part with and I did not press them at that time because I did not suspect wheat to be the cause of the mischief. Samples of wheat, however, along with those of other cereals were sent to the public health chemist for examination in collaboration with the Professor of Botany of the Government College, Lahore. In the meantime I was struck with a general complaint of the patients that whenever they ate wheat *chappatis* there was a set-back in their progress. The spasticity of the legs increased and they felt worse next morning. At first I took this to be just an accident but later when they persisted in their complaint I instituted a detailed enquiry. It was elicited that this complaint came only from those who had old stocks of wheat, while those who were not using wheat, or had obtained fresh stocks of wheat, did not suffer from such exacerbations of the symptoms. It was discovered that some of the villagers had not actually disposed of their old stocks of *dāl* and rice, and were still making use of them. These also said that when they partook of *dāl* and rice they did them no harm, but when *chappatis* made from old wheat were taken it made them feel worse. This focussed my attention on the wheat. The old stocks of wheat were found to be contaminated with seeds of *Vicia sativa* (*akta*) to a considerable extent. A handful of wheat when placed on a dish showed eight or ten seeds of *akta* at a glance. The report of the public health chemist confirmed this, and he reported that wheat flour was contaminated with *akta* as well. As a further test that the seeds contaminating the wheat were of *Vicia sativa* and nothing else, the seeds were sown and grown up plants compared with the dried specimen of *Vicia sativa* plant kindly given to me by the Professor of Botany, Government College, Lahore. The use of old wheat was discontinued and the complaint of set-backs ceased with it.

In view of the observations made and explained above I am of the opinion that seeds of *Vicia sativa* contaminating the wheat were the root cause of lathyrism in this outbreak. The fact that the incidence of the disease coincided with harvesting the wheat crop lends support to this view.

Treatment

Proper dietetic and medicinal treatment could not be carried out on account of the extreme poverty of the sufferers whose meagre resources had been further depleted by the long illness of the earning members, and also by their payments to quacks, *hakims* and *vaids* in the hope of getting cured during the four months prior to my visit. At my request the Sialkot District Board very considerably sanctioned Rs. 200 for the treatment of the cases. Another Rs. 20 were collected by contribution. This enabled me to provide rations of milk, eggs and vegetables for the cases (one family had to be given even wheat to save the members from starvation), and also to institute medicinal treatment. Mild cases were put on iron-arsenic mixture while advanced cases were given an iodide mixture. A digestive tonic mixture was also given when symptoms demanded it. With alteration in diet, the disease was arrested but the improvement of cases was very slow. Medicinal treatment failed to produce any marked effect. After a month's trial of this routine, intensive vitamin treatment was added to it. Half the cases were put on Adexolin and the other half on halibut oil. Under the vitamin treatment there was a marked acceleration in the rate of progress of the cases. Full doses of halibut oil and Adexolin were administered regularly. On account of the high cost of these preparations their administration had to be restricted to bad cases only, and when improvement reached a certain stage these had to be stopped. Under this treatment the aching of spastic muscles and tingling sensation in the feet, when present, were the first to disappear. The spasticity diminished and the muscles gradually acquired strength. The treatment was kept up for six months. At the end of that period more than half the cases had returned to their respective avocations while the remainder had progressed remarkably. Only a few milder cases, however, could be considered cured completely as quite a number still complained of stiffness of the legs.

Discussion

Some uncommon features were observed in this outbreak which are worth mentioning.

McCombie Young (1927) found malarial fever a common antecedent of lathyrism. The village Nawar Kulla is not situated in a malarious tract, no one was found to possess a palpable spleen and only 2 cases out of 64 gave history of intermittent fever preceding the attack.

Sensory disturbances which formed quite a marked feature of this outbreak have generally not been noticed. Marked anaesthesia and analgesia are described by Proust (Stockman, 1917), but not by other authors.

The sphincters are usually described as affected but they were not affected at all in this series of cases. Sexual potency, which is often

(Continued at foot of next column)

THE USE OF BLOOD TESTS IN EXCLUDING PATERNITY AND MATERNITY

By S. D. S. GREVAL

LIEUTENANT-COLONEL, I.M.S.

Imperial Serologist and Chemical Examiner to the Government of India

Imperial Serologist's Laboratory, The School of Tropical Medicine, Calcutta

I. Definitions and explanations of terms

By the term 'blood test' in connection with excluding paternity or maternity is meant the determination of the blood groups and the blood types of the subjects concerned.

The blood groups are four : O, A, B and AB. The types within each group are : M, N and MN. The accompanying diagram explains these and

(Continued from previous column)

reported as lost (Stockman, 1917), was reduced but never altogether lost.

The legs only are usually reported to be affected (Sleeman, 1844). In this outbreak the arms were involved in a number of cases.

Sex incidence is generally reported by authors as 5 to 10 times greater in the males than in the females. In this outbreak it was 3 males to 2 females who suffered.

Lathyrism being absolutely unknown before in this part of the country it is rather difficult to arrive at much aetiological and epidemiological data from observations made in one outbreak. Taking everything into consideration it seems probable that this outbreak was due to the presence of seeds of *Vicia sativa* in wheat. It thus lends support to the *akta* contamination theory first advanced by Anderson *et al.* (1925). The legume *Lathyrus sativus* is neither grown nor used in this area to any extent and is, therefore, out of the question.

Avitaminosis seems to play some part in the production of symptoms. In support of this it may be stated that many symptoms resemble beri-beri and pellagra, two known 'deficiency' diseases, and that the cases improved remarkably under dietetic and vitamin treatment.

Judging from the symptoms it seems probable that the pyramidal tracts of the spinal cord are chiefly involved, although variations in symptoms suggest that more than one tract is affected. It is also probable that the peripheral nerves, both motor and sensory, are involved.

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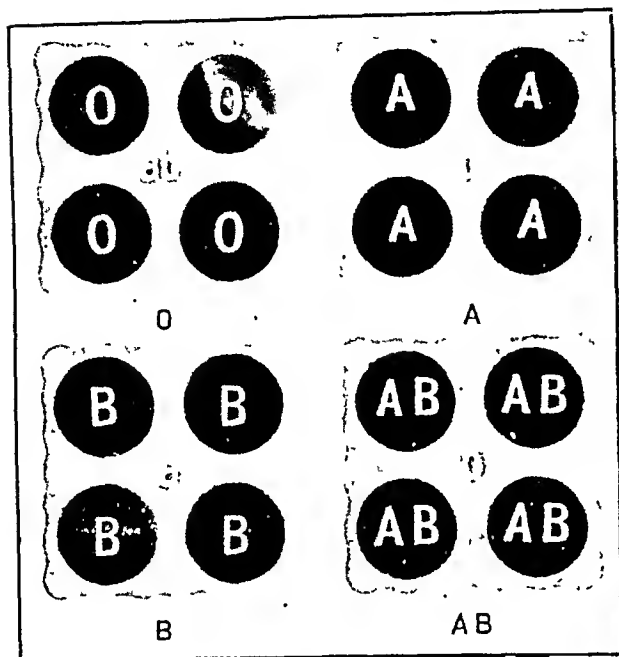
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two other comparatively unimportant terms, and also gives the equivalents of the group in the old terminology which should now be forgotten.

Blood groups.



Jansky
I
II
III
IV

Moss
IV
II
III
I

New
O
A
B
AB

A and B are the iso-hæmagglutinogens.

a and b are the corresponding iso-hæmagglutinins.

The group is named after the iso-hæmagglutinogens.

The four groups indicate the only four possibilities, compatible with life, in which the iso-hæmagglutinogens and the iso-hæmagglutinins can co-exist in the same subject. In a 'defective' group an iso-hæmagglutinin which can exist compatibly with life is absent (e.g., O, a; A, o).

Further division of A into A₁ and A₂ (and into A₁B and A₂B) increases the number of groups to six.

Quite unrelated to A and B are the hæmagglutinins (not iso-hæmagglutinogens) M and N. They occur as M, N, or MN in all subjects of all groups. No subject is free from them. They differentiate three types in each group and thus make possible 12 descriptions of blood, if only the original four groups are considered, or 18 descriptions, if sub-groups with A₁ and A₂ are also considered. A blood may be:—

OM	ON	OMN
AM	AN	AMN
BM	BN	BMN
ABM	ABN	ABMN

There are difficulties of technique in determining A₁ and A₂. They are, therefore, ignored by many workers in forensic medicine. M and N are easily determinable and are receiving due recognition all over Europe and America.

II. Legal position

The legal opinion in England concerning the reliability of the groups in determining paternity (or maternity) was given to me in a nutshell by a veteran worker in biology at an ancient seat of learning and also a J.P., in January 1938,

on the occasion of the combined session of the All-India Science Congress Association and the British Association for the Advancement of Science, in Calcutta. The scientist J.P. had been advised by a whole-time magistrate thus: 'When evidence dealing with blood groups is adduced, listen attentively, take notes and ask questions; otherwise the party adducing the evidence will say in the higher court that the presiding judicial authority did not follow the evidence; having done as advised forget all about it'. This was at least the conservative opinion and as such was respected by all admirers of good old conservative institutions.

During the same year things appear to have moved very fast indeed. A case decided on the evidence of blood groups and blood types was published in the *British Medical Journal* of 21st May, 1938.

In America and Germany blood groups were pressed into service of the law many years ago. Lately blood types have done even more service. Cases which were decided on the evidence of the groups some time ago have been re-opened for the evidence of the types.

The writer has tested for medico-legal purposes only a few parties consisting of several members. His opinion, however, has been given to a party's legal advisers and medical officers of certain Indian States. He has not yet sent a report to a court of law. Many enquiries have been answered. The number of the enquiries is increasing and is responsible for this communication.

III. Possible and impossible parents and offspring

In this communication it is not intended to go into the details of the serological technique of grouping and typing blood. Nor is a discussion on biological subtleties and genetics intended. Suffice it to say that the blood groups of the parents are known to be inherited by the offspring in a certain way only. The same is true of the blood types. The appended tables give the inheritance of the blood groups and the blood types.

Table I can be summarized in two laws:—

1. The iso-hæmagglutinogens A and B cannot appear in the blood of a child unless present in the blood of one or both parents.

2. A group AB parent cannot have a group O child and a group O parent cannot have a group AB child (aid to memory—universal donors and universal recipients cannot be parents and offspring to each other).

The genetic basis is triple aldomorphism. The contrasting characters are O, A and B. O is recessive while A and B are dominant.

Table II also can be summarized in two laws:—

1. The agglutinogens M and N cannot appear in the blood of a child unless present in the blood of one or both parents.

: 2. A type M parent cannot have a type N child and a type N parent cannot have a type M child.

The genetic basis is the fact that both M and N are dominant. The genotypes of the phenotypes M, MN and N are MM, MN and NN.

It will be observed that the second law, both in the case of the groups and the types, makes it possible to exclude an offspring after examining one parent only. An AB parent cannot have an O offspring no matter what the blood group of the other parent is. Nor can an O parent have an AB offspring no matter what the blood group of the other parent is. Similarly a type M parent cannot have a type N offspring no matter what the type of the other parent is. Nor can a type N parent have a type M offspring no matter what the type of the other parent is.

It will also be observed that two A parents, two B parents, and A and B parents can have O offspring.

The determination of the group and the type can only *exclude* an offspring or a parent. It can only prove that Mr. Smith is *not* the father of Master Tom. It cannot prove that Mr. Brown is the father of Master Tom. As affirmative evidence the most it can indicate is that Mr. Brown *can be* the father of Master Tom. The same remarks apply to Mrs. Smith and Mrs. Brown regarding motherhood.

IV. Arranging for performance of the blood tests

Test number one. Determination of blood groups.

Any medical man in charge of a bacteriological laboratory and interested in serology will be able to determine the groups of the child and of the putative parents. Every province in India has at least one such laboratory. Most military laboratories also keep the testing sera. The party to be tested simply walks into the laboratory and the serologist does the rest. A few c.cm. of blood are taken from a vein. The red blood cells of the subjects are tested with known sera and the sera of the subjects are tested with known cells. The result is ready in about an hour. Giving of the blood is not very painful.

If the party decides to send the blood to the laboratory of the Imperial Serologist the following specimens are needed:—

(1) About 0.25 c.cm. of blood dried on a chemically-pure filter paper. The blood is dried quickly but not in the sun. An unstained part of the filter paper should also be available.

(2) About 0.5 c.cm. of clear serum. This is taken from a test-tube in which blood (about 3 c.cm.) has been allowed to clot, *under sterile condition*, without disturbing the contents much.

(3) About 0.5 c.cm. of serum turbid with red blood cells. This is taken after shaking the contents of the tube, after the clear serum has been removed.

The specimens are taken by a responsible medical man, preferably an official, and sent in a sealed and registered parcel. The impression of the seal is sent in another sealed and registered parcel.

The stain on the filter paper is tested for the iso-agglutino-gen by absorption. The clear serum is tested for the iso-agglutinins against known red blood cell suspensions.

If all has been well with the sterile precautions the turbid serum will yield, on centrifuging, red blood cells in a good state of preservation. They are made into a 2 per cent suspension and examined for auto-agglutination. If found satisfactory, they are tested against known sera.

The writer considers results obtained from stains satisfactory and those from serum confirmatory. The direct testing of the red blood cells obtained from the turbid serum is also confirmatory. It will not replace the absorption test; old red blood cells are not to be considered reliable in hæmagglutination for medico-legal purposes.

Opinion is withheld if a 'defective' group complicates an incompatible combination. Fresh blood will be required for repeating the tests.

The determination of the group may exclude paternity or maternity (*vide* table I). If it does not, determination of the type must be undertaken.

Test number two. Determination of blood types.

This test is undertaken in India, at present, in the writer's laboratory only. Fresh blood is necessary.

TABLE I
Blood groups in parents and children

	Parents	Children possible	Children impossible
1	O × O	O	A, B, AB
2	O × A	O, A	B, AB
3	O × B	O, B	A, AB
4	A × A	O, A	B, AB
5	A × B	O, A, B, AB	
6	B × B	O, B	A, AB
7	O × AB	A, B	O, AB
8	A × AB	A, B, AB	O
9	B × AB	A, B, AB	O
10	AB × AB	A, B, AB	O

TABLE II
Blood types in parents and children

	Parents	Children possible	Children impossible
1	M × M	M	MN, N
2	M × MN	M, MN	N
3	M × N	MN	M, N
4	MN × MN	MN	M, N
5	MN × N	MN, N	M
6	N × N	N	M, MN

(Continued at foot of opposite page)

THE USE OF DYES IN VARIOUS FUNGAL INFECTIONS

By P. A. MAPLESTONE, D.S.O., D.Sc., M.B., D.S., D.T.M.

and

N. C. DEY, M.B. (Cal.)

(From the Medical Mycology Inquiry, Indian Research Fund Association, at the School of Tropical Medicine, Calcutta)

GENTIAN VIOLET has been used in dermatology for a long time. As early as 1900 Hyde and Montgomery in their treatise on skin diseases mention the efficacy of gentian violet as a local application in various skin conditions. The first laboratory investigation on the action of gentian violet dates from the work of Churchman (1912) who observed the marked selective action of this dye *in vitro* on Gram-positive organisms. He proved its practical value (1920) when applied to wounds and ulcers. Since then gentian violet has been widely used in different staphylococcal infections. Sauphar (1923) and Sutton (1938) recommended its use locally in 'pemphigus neonatorum'; Smith and Casparis (1923) and Young and Hill (1924) used it intravenously in staphylococcal septicæmia; MacKenna advocated it in multiple boils in children (1937).

Gentian violet and other aniline dyes were tested *in vitro* against ringworm fungi by Schamberg and Kolmer (1922), and Kingery and Adkisson (1928). The fungicidal and fungistatic properties of some of these dyes were found to be powerful. These dyes have also been

tested *in vitro* against monilia by Clark (1927), Iain and Kurotchkin (1930), Hesselstine and Hopkins (1935), Gomez-Vega (1935) and clinically by Faber and Dickey (1925) in thrush, Plass and others (1931) in monilial vulvo-vaginitis, Gomez-Vega in monilial paronychia and by Ormsby (1938) in different monilial affections.

PART I. PURULENT FOLLICULITIS

Acton and McGuire (1929) fully described a condition of purulent folliculitis common in India and elsewhere in the East the cause of which had hitherto been unknown. The results of their work may best be described by quoting their conclusions in full:

'(1) In India there is an intractable folliculitis attacking the upper part of the hair follicles of the beard area, neck, chest, arms and legs which is known as "coaly itch".

(2) The lesions are more commonly seen in men than women and chiefly amongst the poorest classes.

(3) The infection is due primarily to a ringworm fungus with secondary staphylococcal infection.

(4) The fungus is closely allied to the *Achorions** in its morphological characters.

(5) It differs slightly in cultural characters, etc., from the species now known as *Trichophyton violaceum*, but not sufficiently to justify its description as a separate species.

(6) The disease can now be cured by the application of a 5 per cent gentian violet solution painted on the area three daily for three weeks.

(7) When marked induration of the corium is present, epilation of the hairs by x-rays may be necessary to bring about a cure'.

Since that time gentian violet has been in regular use in the dermatology department of the Calcutta School of Tropical Medicine for the treatment of this infection as well as for ringworm of the foot and allied conditions commonly known as 'mango toe'. Because this trichophyton infection is practically always complicated by a staphylococcal folliculitis it was felt that a combination of two dyes, one of which was particularly fungicidal and the other bactericidal, might result in the production of a better remedy than gentian violet alone. In the course of a series of experiments on the effect of various dyes and chemicals on four species of fungi including *A. violaceum* the report of which was published by Maplestone and Dey (1938) it was found that brilliant green was a very good fungicide but not so powerful a bactericide as was crystal (or gentian) violet. A combination of these two dyes resulted in a greatly enhanced fungicidal effect and a bactericidal effect equal to that of crystal violet alone. Because crystal violet is much more expensive, even if allowance is made for its greater strength than gentian violet on account of the latter containing impurities, gentian violet was used as it is as powerful as crystal violet in its effect.

A solution of gentian violet 5 per cent in 20 per cent alcohol was the strength adopted by Acton and McGuire but an excess of dye was

(Continued from previous page)

Summary

1. The blood test as employed in excluding paternity or maternity has been defined and explained.

2. The legal position of the test has been indicated.

3. Tables of possible and impossible parents and offspring have been given.

4. Arrangements for the performance of the test have been detailed.

A list of easily available publications is given below. For consultation in person, most biologists and anthropologists are competent consultants.

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* Further study of this organism has resulted in it being placed in the genus *Achorion* Remak, 1845, by Dey and Maplestone (1935).

left on the skin so the strength was later reduced to 4 per cent without lessening its efficacy. A



Fig. 1.—Paronychia of all the nails caused by monilia infection



Fig. 2.—Moniliasis showing interdigital affection and paronychia with dystrophy of nails.

watery solution of gentian violet was advocated by Percival (1936) and Florance (1936) as an

alcoholic solution was stated by them to be irritating. Our opinion is that alcohol is a better solvent than water, and this solution dries more rapidly than a watery solution; this is an important practical point in the hot, wet season of the year when the skin surface is always more or less moist. Also we do not find that alcohol in 10 per cent strength has ever caused irritation in the conditions for which it is applied to the skin by us. Therefore the lotion we first used was one containing 2 per cent each of gentian violet and brilliant green in 10 per cent alcohol.

A certain number of patients complained of mild irritation, so the dyes were reduced to a strength of 1 per cent each leaving the alcohol in strength of 10 per cent and no further complaints of irritation occurred.

Method of treatment.—The patient is told either to puncture the pustule at the root of the hair with a sterile needle or to pull out the hair with a pair of forceps. The latter is preferable so the patient is encouraged to pull out as many hairs as possible. The pus is carefully swabbed with a piece of dry cotton-wool so that it may not spread to and infect the other follicles. This operation is repeated daily till the eruption subsides. A solution of brilliant green and gentian violet 1 per cent each in 10 per cent alcohol is dabbed twice daily on the affected hair follicles. The dye should not be removed with soap and water as all our patients are tempted to do, because the presence of free alkali in soaps irritates the skin and moreover by washing there is a chance of spread of infection to the surrounding hair follicles. The patient is told to clean the affected area with alcohol once a week, preferably on the day of attending the department for examination, so that the hair follicles may be clearly visible. Methylated spirit has been used by many of our patients without any appreciably bad effects.

When these instructions are carefully carried out patients improve quickly. If there is a scaly eczematous condition present as is sometimes the case we use in addition an astringent lotion containing 120 grains of zinc sulphate and 80 grains of copper sulphate to a pint of water.

The attached table records some of the cases treated by the combined dye.

PART II. INTERDIGITAL AFFECTIONS

Interdigital affections of the hands and feet are very common in the tropics. These may be due to one of the following causes:—

(1) The commonest is infection with *Epidermophyton floccosum* (*E. cruris*), the cause of common ringworm of the body. This usually affects the interdigital space between the fourth and fifth toes. It is commonest amongst those whose work causes the feet to remain wet for long periods together. It also affects Europeans and others in the tropics whose feet are habitually moist from excessive perspiration on

TABLE I

Showing results of treatment of a number of cases of *Achorion violaceum* var. *indicum* infection with a combined solution of brilliant green and gentian violet. All were adult males

Serial number	Occupation	Duration of disease	Parts of the body affected	Previous treatment if any, in our O. P. Dept. with its duration	Duration of the treatment in weeks	RESULTS
1	Milkman	5 years	Legs	Nil	3	Cured.
2		1½ "	Legs and beard region.	Nil	3	"
3		1 year and 4 months	Legs and thighs	Lotio gentian violet 4 per cent —1 year. Lotio brilliant green 2 per cent —3 months.	17	"
4	Bearer	4 years	Legs	Nil	6	Improved.
5	Durwan	3 "	"	Nil	14	"
6	Student	10 months	"	Nil	2	Almost cured.
7	Cultivator	3 years	"	Nil	12	Cured.
8	Cooly	2 "	"	Nil	5½	"
9	Student	2 "	"	Nil	5	"
10	Shopkeeper	1 year	"	Nil	6	"
11	"	11 years	"	Lotio brilliant green 2 per cent —2 weeks.	23	"
12	Cultivator	2 "	"	Nil	12	"
13	Student	9 months	<i>A. violaceum</i> legs with secondary streptococcal infection.	First treated for the streptococcal infection.	12	"
14	Jute mill cooly	3 "	"	Nil	8½	"
15		12 "	Legs		20	"
16		4 months	"		5½	"
17	Tailor	1 year	"	Nil	4	"
18	House servant	10 months	"	Nil	14	"
19	Clerk	18 years	Legs and beard region.	Nil	8	"
20	Cooly	2 months	Legs	Nil	7½	"
21	Shopkeeper	10 "	"	Nil	8½	"
22	Barber	4 years	Legs and beard region.	Nil	14	Almost cured. Cured.
23	Blacksmith	6 months	Legs	Nil	4	"
24		1 month	"	Nil	3	Improved.
25		2 years	"	Nil	4	"

Cases marked 'improved' ceased attending before cure was complete.

account of being covered by shoes and socks. This condition is so common that no clinical description is necessary.

(2) The second condition, as mentioned by Acton and McGuire (1931), is caused by *Actinomyces keratolytica*. Two types have been ascribed to this infection. The first is the 'deep type of fissured mango toe'. The fissures extend through the thick skin of the soles and are deeper than those in a similar affection caused by the ringworm fungus. The condition is painful and is liable to secondary streptococcal infection. In the second variety the infection starts as an intertrigo and extends in a gyrate manner on the palms and soles exposing a raw surface. Infection with *Actinomyces keratolytica* is common in those who walk bare-footed or work in mud or manured soil and it is therefore very common amongst cultivators.

(3) This type of interdigital affection is caused by yeast-like organisms (monilia, saccharomyces, etc.) and is commonly seen on the palms but also has been described on the foot by different workers. In Calcutta we have found yeast-like organisms in the interdigital spaces of the toes but always in association with ringworm infection.

Intertrigo saccharomycetica is a form of dermatitis caused by yeast-like organisms. This condition has been described by Whitfield (1908) in England, and Phalen and Nichols (1908) in the Philippines. Kaufmann-Wolf (1914) in Germany, and Gougerot and Gancea (1914) in France recognized an interdigital affection caused by monilia and confirmed it by finding mycelia and spores in the scales and growing *Oidium albicans* in culture. Fabry (1918) gave this interdigital affection a special name 'erosio interdigitalis blastomycetica'.

This condition is common in women who immerse their hands frequently in water while washing and cleaning utensils and clothes. The skin in the web of the fingers is made sodden from the action of alkalis in the cleansing substances.

The disease may start as a superficial sealy erythema or a blister. In the lesions we generally find a plaque of heaped-up white sodden epithelium surrounded by a narrow, erythematous margin which may be gyrate in shape. On the hand generally the webs on either side of the middle finger or the third interdigital space may be affected first and from here the infection spreads to the other interdigital spaces or even to the nails, causing paronychia.

Treatment.—In the treatment of these interdigital affections we have used the same solution containing brilliant green and gentian violet. The part should be cleaned and dried and then painted with the above solution twice daily. It is very important that the affected part should be kept dry during and after the course of the treatment. If necessary the part may be dusted with an antiseptic dusting powder. Ordinary cases respond with this treatment very well. In neglected cases particularly in the feet where secondary streptococcal infection has occurred, cellulitis of the foot is not uncommon. In these cases routine treatment for cellulitis should be adopted in addition to painting the part with the above solution twice or thrice daily.

PART III. PARONYCHIA

This is an inflammatory condition of the nail fold. Two types of organisms may be responsible for this affection. The first one is *Actinomyces keratolytica* according to Acton and McGuire (1931).

The second one is a yeast-like organism and has been mentioned by Kumer (1921), Shel mire (1925) and others. The infection is favoured by constant soaking of the hand especially in water containing alkalis.

There is inflammation of the paronychia tissue which is characterized by 'bolsterlike swelling' and tenderness of the soft tissue lining the nails. The space between the nail and euticular fold remains gaping and from this space a whitish or watery discharge exudes on pressure. The gaping may be so prominent that a platinum loop can be easily introduced for collection of the material for examination. The disease starts at first on one nail and other nails become affected if the infection is allowed to persist. The diseased nail becomes deformed and shows an irregular surface or transverse furrows.

The material recovered from the affected part often shows mycelia and spores and culture on Sabouraud's medium produces an abundant growth of the infecting organisms. In Calcutta we found monilia infection in many of these cases.

Shel mire (1925) pointed out that these cases were extremely resistant to treatment.

We have treated these cases of paronychia with the gentian violet brilliant green mixture. The affected part is painted twice daily with a fine-pointed cotton-wool swab so that the solution may reach the space between the nail and paronychia tissue and cure is generally effected in about a month.

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SCHICK TEST AMONGST A GROUP OF INDIANS AND ANGLO-INDIANS IN CALCUTTA

By C. L. PASRICHA

MAJOR, I.M.S.

K. BANERJEE

and

RUTH F. WORDSWORTH

(From the Department of Bacteriology and Pathology,
School of Tropical Medicine, Calcutta)

THE results of the Schick test carried out in certain tropical countries have shown that there is a higher degree of immunity to diphtheria (as judged by a higher proportion of Schick-negative reactors) in the inhabitants of the tropics than is found in those who live in temperate or cold climates. Further, this immunity is acquired earlier in life in the tropics than in

to stimuli received by contacts with diphtheria bacilli and their products. Amongst the well-to-do classes the chances of contact with diphtheria bacilli are considerably less than in the poorer and more densely populated parts of big towns.

In India, as in other tropical countries, although the prevalence of clinically recognizable forms of diphtheria is very much lower than in temperate climates, the antitoxic immunity has been shown to be much higher. Fox, McDonald and McCombie Young (1923) were the first to carry out a Schick-test survey in India amongst 265 European children and 6 adults from three schools in Shillong during an outbreak of diphtheria. Rambo (1929) recorded the result of 193 tests in Indians in Mangeli, Bilaspur district, Central Provinces, and Das (1934) carried out a Schick test on 284 Indians in Naini Tal district. The results obtained by these three workers are summarized in table I.

TABLE I

Showing the results of Schick-test surveys carried out by previous workers in India

Race	Fox <i>et al.</i> (1923)				Rambo (1929)				Das (1934)			
	Europeans and Anglo-Indians				Indians				Indians			
	Shillong				Central Provinces				Naini Tal			
Place	Age group	Number tested	Number positive	Per cent positive	Age group	Number tested	Number positive	Per cent positive	Age group	Number tested	Number positive	Per cent positive
	1-5 years	11	5	51.5	Under 1 year	27	9	33.3	0-4 years	17	8	47.1
	5-10 "	97	50	51.5	1-3 years	45	25	62.0	5-9 "	150	19	12.7
	10-15 "	137	57	41.6	4-6 "	28	3	10.7	10-14 "	81	4	4.9
	Over 20 "	6	4	66.6	7-10 "	36	5	14.0	15-19 "	13	0	0.0
					11-14 "	38	1	2.6	Over 19 "	23	1	4.3
					Over 15 "	19	0	0.0				
TOTAL		251	116	46.1		193	43	22.2		284	32	11.2

other parts of the world. Certain workers have recorded that this antitoxic immunity to diphtheria was more marked amongst the local inhabitants than in European children living in the same place. That this difference in antitoxic immunity is not a result of any racial peculiarities but the result of environmental conditions has been well shown in a critical survey of the literature by Dudley (1929) and Doull (1930). These and other workers have shown that age, race, social conditions or nutrition have in themselves very little or no influence on naturally-acquired antitoxic immunity except in so far as they influence the contact between man and the diphtheria bacilli. The development of antitoxic immunity is not due to physiological processes dependent on race or age, but to the response on the part of the body

Through the courtesy of Dr. R. A. O'Brien, Director, Wellcome Physiological Laboratories, a supply of Schick toxin was sent for trial in Calcutta. Part of the supply was sent by air in a thermos flask and part in cold storage by steamer direct to Calcutta. After receipt the test-toxin was kept at a temperature of -6°C . in a box in the freezing chamber of an electrical refrigerating machine. When required to be taken out for use the toxin was placed in a thermos flask containing a lump of ice. Both the supply received by air and by the steamer gave clear-cut results. When tested on known Schick-positive reactors two months after the date of expiry the toxin was found to give well-marked reactions.

The test was carried out according to the recognized standard methods, and readings were

made after 2, 4 and 7 days. The majority of the Indian children tested were drawn from very low economic strata of society living in densely crowded areas of the city. The Anglo-Indian children were living in much better conditions, the majority of them being inmates of well-run residential schools. The 31 Anglo-Indian adults examined were nurses from one of the local hospitals. The results obtained are given in tabular form.

TABLE II

Showing the Schick-positive reactors in the Indians and Anglo-Indians tested

	Indians	Anglo-Indians	Total
Number tested	104	137	241
Number of Schick-positive reactors.	23	68	91
Percentage of Schick-positive reactors.	22.1	49.6	37.8

judged by the number of carriers, is not less common in India than in temperate climates. The immunity however is acquired earlier in life, particularly in those who live in congested areas under conditions which are ideal for the dissemination of diphtheria bacilli.

The results obtained in Calcutta and those obtained in other parts of India suggest that in each age group the Indian children show a much higher grade of immunity than the Anglo-Indian children. At first sight it appears that the ability to respond to the specific immunization is greater in case of the Indian than the Anglo-Indian and that we have an example of racial variation in susceptibility of individuals belonging to different races living under the same general environment. A closer study of the environmental conditions of these two groups showed that, whereas the Indian children tested were living under conditions which exposed them to a more intensive stimulus during the earliest year of their lives, the Anglo-Indian children led a more sheltered life. Schick tests done in

TABLE III

The Schick-positive reactors in different age groups

Age group	INDIANS			ANGLO-INDIANS		
	Number tested	Number positive	Per cent positive	Number tested	Number positive	Per cent positive
6-12 months	2	1	..
1-3 years	6	8	5	62.5
4-6 "	41	38	20	52.6
7-9 "	46	46	21	44.8
10-12 "	11	12	8	66.7
19-26 "	31	12	38.7

Unfortunately it was not possible to extend these observations with the amount of Schick toxin available. Although one must be cautious in attempting to draw any definite conclusions from data as scanty as those presented here and recorded previously in India certain suggestions can be reasonably made.

The Schick test has been used extensively throughout the world and is recognized almost universally as a reliable index of susceptibility to or immunity against diphtheria. If the immunity, as demonstrated by the Schick test, be interpreted as being due to previous specific infection it follows that diphtheria infection is not less common in Indian than in European or American cities where clinically recognized forms of the disease are of comparatively frequent occurrence. Vardon (1923) found 49 carriers of diphtheria bacilli amongst 1,000 persons drawn from different parts of India whom he examined in Kasauli and who had gone there for antirabic treatment. Of the 49 diphtheria strains isolated 7 were virulent. This carrier survey, which should be repeated in different parts of India, shows that infection with diphtheria bacilli, as

a small series of 12 Indian children living under better environmental conditions gave results comparable to those obtained in Europe or America. There is probably no real racial difference in immunity to diphtheria, and results which suggest such difference do not take into consideration the various social and economic factors which undoubtedly play a very important rôle in the development of natural immunity.

The results obtained in Calcutta and in other parts of India suggest that the absence of clinical diphtheria is probably more apparent than real and that every effort should be made to exclude infection by diphtheria bacilli even in mild and atypical infections of the throat or nasopharynx.

That 12 (39 per cent) of the 31 nurses of the age group 19 to 26 years were Schick-positive, or susceptible to diphtheria, stresses the importance of this test. It has been shown by several workers that with the introduction of Schick test and active immunization of susceptible nurses and the domestic staff of fever hospitals the incidence of diphtheria amongst the staff of these hospitals has been reduced to insignificant

(Continued at foot of opposite page)

MALARIAL INFECTION IN THE PLACENTA AND TRANSMISSION TO THE FŒTUS

By B. M. DAS GUPTA
(Calcutta School of Tropical Medicine)

DR. C. STRUCKLAND kindly gave the writer a blood film which was taken from a 15-hour old baby of a mother who had been suffering from *Plasmodium vivax* infection during pregnancy. The smear showed a large number of parasites (benign tertian) in various stages of development, from the ring stage up to maturity, including some aberrant forms. This finding has

(Continued from previous page)

proportions. The evidence in support of the value of active immunization of those susceptible is so strong that there can be no reasonable doubt as to its effectiveness in protecting an individual against diphtheria.

Summary

(1) A series of 241 residents in Calcutta have been tested for susceptibility or immunity to diphtheria by the Schick test; 91 or 37.8 per cent of these were Schick-positive reactors.

(2) Of the 137 Anglo-Indians tested 49.6 per cent possessed no immunity to diphtheria whereas of the 104 Indians tested 22.1 per cent were non-immune. The greater immunity amongst the Indians is better seen in the different age groups. It is suggested that the differences in immunity seen in Indians and Anglo-Indians is not based on racial peculiarities but on differences in environmental conditions.

(3) The importance of Schick test followed by active immunization of susceptible nurses and other staff of fever hospitals or diphtheria wards, where risk of infection is unusually high, is stressed. That there is a need for this is shown by the finding of a high percentage (39 per cent) of nurses who possessed no natural antitoxic immunity to diphtheria.

(4) Schick-test toxin can be imported without any loss of potency either in a cooled thermos flask by air mail or in cool storage by steamer. It can be stored in any domestic type of refrigerator without showing deterioration. The test itself is so simple to perform and economical of time as to permit of its widespread application to large samples of the population in different parts of India.

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already been reported (Das Gupta, 1939). The occurrence of mature schizonts in the blood of the infant 15 hours after birth proves beyond doubt that the infection was acquired *in utero* at least 33 hours before birth.

It is now generally believed that, although a rare condition, congenital malaria does occur when there is failure of the protective effect of the placenta. The protective action fails when there is any injury (during pregnancy) resulting in placental hæmorrhage. Dr. Baird, who was in charge of the patient mentioned above, informed the writer that the mother gave no history of even slight injury at any time during pregnancy.

With a view to studying the effect of malarial infection on pregnant monkeys with reference to the possibility of transmission to the fœtus, we inoculated a pregnant *rhesus* monkey with *Plasmodium knowlesi*, a species of simian malaria parasites that produces a very virulent infection in *rhesus* monkeys, causing the death of the animal if prompt treatment is not accorded.

Experimental

A recently trapped well-nourished specimen of *Silenus rhesus* weighing 11 kilogrammes was purchased from a local dealer. The animal was in advanced stage of pregnancy as verified by skiagraphy. It was inoculated intravenously with 0.5 c.cm. of monkey's blood showing a heavy infection with *P. knowlesi*.

Six days (usual incubation period) later, its blood was examined daily for eight days. As there was no evidence of infection, it was re-inoculated with approximately four times the original dose. On the third day of the second inoculation, scanty ring forms were detected in the thick film. Gradually the parasite count increased and the animal became more and more anæmic. On the ninth day, it became severely ill, unable to sit up and refused all food. Quite a number of parasites, chiefly developing schizonts, and pigmented mononuclears were found in the blood smears. The red cell count fell to 1,600,000 per c.mm. Other evidence of anæmia such as punctate basophilia, anisocytosis, polychromasia were present. Lest the animal should not survive till the next morning, it was chloroformed at 5 o'clock in the afternoon and complete autopsy was done. The maternal organs gave evidence of acute malarial infection. The endothelial cells of the spleen and liver were found packed with large masses of pigment. The fœtal blood was rich in hæmoglobin. The red cell count was high (8,200,000 per c.mm.) as compared with that of the newly-born human baby. There were a good number of nucleated red cells. Anisocytosis was marked. Smears of the spleen, liver and bone marrow of the fœtus were carefully examined. Neither parasites nor hæmozoin pigment was found.

Placenta.—Smears prepared with the tissue snipped off the maternal surface shows a

stupendous number of parasites in different stages of schizogony and a good number of macrophages with ingested parasites and pigment. No gametocytes are seen. In sections the intervillous space is found packed with parasitized red cells and some pigmented phagocytes, the number of the infected red cells being estimated at more than 95 per cent, while the vessels of the chorionic villi are entirely free from infection.

Comment.—Although some observers have noted that congenital malaria is a common occurrence in localities where the disease is endemic; for example, Ziemann records that Weselko (Mense, 1924) in Albania attributed to congenital malaria the death in the first week of 144 children of mothers infected with *Plasmodium falciparum*. Swellengrebel (1925) records 48 cases of congenital malaria in the Near East in each of which a microscopical diagnosis was made at periods varying in time from one to five days, yet the trend of current opinion is to accept the view that the transmission of malaria from the mother to the foetus is an unusual phenomenon. This opinion has been particularly emphasized by Blacklock and Gordon (1925). These workers after a study of a large series of cases have concluded that transplacental infection of the foetus is of great rarity and may be acquired when there is a failure of the barrier action of the placenta. Lately, Garnham (1938) investigated over 400 cases to see if congenital malaria occurred. In no case could placental transmission of the malaria parasite be detected. The tremendous infection of the maternal organs especially the intervillous spaces of the placenta in the experimental monkey (plate XII, fig. 3, and plate XIII) and the total absence of the parasites or any evidence of infection in the foetus (plate XII, fig. 4) show very clearly that the protective function of the placenta is very efficient. This finding is in complete agreement with the observation of Blacklock and Gordon (1925). The protective effect of the placenta sometimes however fails, allowing the parasites to pass through and produce an infection of the offspring. This failure on the part of the placenta has been attributed to injury resulting in placental hæmorrhage, by Clark (1915), Jean (1927) and Thonnard-Neumann (1931) and others. To the present writer it seems rather more likely that the efficiency of the placenta with regard to its protective action is interfered with as a result of damage caused by prolonged parasitic invasion.

Dr. Baird's case, referred to above, may be cited as an example of the failure of the protective action of the placenta as a result of chronic infection. The patient was suffering off and on from fever (malaria) during the entire period of pregnancy with no history of injury.

That duration of infection and not so much the intensity plays an important part is also

borne out by the following facts. While investigating the possibility of placental transmission of leptospira in guinea-pigs it was often noticed that if the infected mother died at a very early stage of the disease the foetus invariably escaped infection; that if it lived a few days more very scanty foetal infection could be demonstrated by the inoculation of the foetal tissues (liver and kidneys) into young guinea-pigs, the smears of these organs being usually negative; that should the animal survive still longer, leptospiræ in fair number were found present in the sections of the liver and kidneys of the foetus. It thus follows that the longer the infected mother survived, the greater was the chance of the infection of the foetus, although the placenta showed an extraordinarily heavy infection even during the early stage of the disease. Furthermore, it has been shown that syphilis is not transmissible to the offspring if the mother acquires the infection during the last few weeks of pregnancy.

It is remarkable that the viscera of the foetus were full of blood, in marked contrast to the great anæmia of the maternal organs. Although there were a fair number of parasites in the peripheral blood, the placental sinuses were crammed with parasitized red cells. The localization of the parasites in these situations was first pointed out by Clark (1915) and later noted by Blacklock and Gordon (1925) and others, and is probably the result of partial stasis in the sinuses.

Summary

An experimental infection in a pregnant *rhesus* monkey with *P. knowlesi* was studied from the view-point of the possibility of the intra-uterine infection of the foetus. It is noted that the foetus is entirely free from parasitic invasion even when the maternal sinuses of the placenta are crammed with parasitized red cells, more than 95 per cent of the cells being infected. The blood of the mother shows extreme anæmia as a result of terrific blood destruction owing to massive infection with the parasite, in marked contrast to the florid blood of the foetus.

It is suggested that the duration of infection and not so much the acuteness is responsible for the failure of the protective function of the placenta.

I wish to express my indebtedness to Dr. C. M. Wenyon, F.R.S., who very kindly examined the materials on which these observations are based and drew my attention to the work of Garnham in this connection. I am also grateful to Professor C. Strickland for his helpful suggestions.

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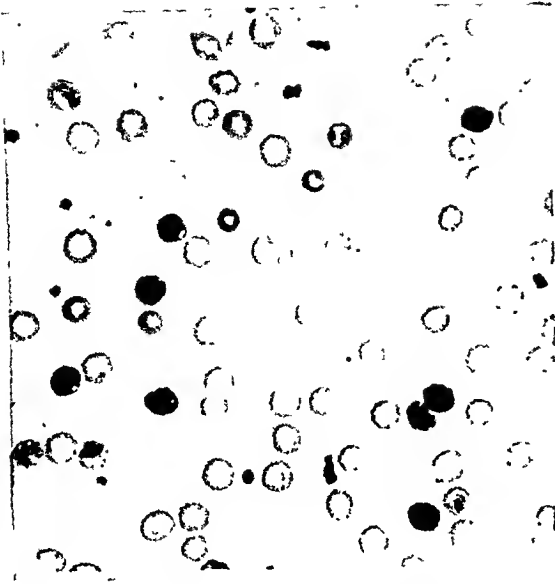


Fig. 1.—Maternal blood smear (stained with combined Leishman and Giemsa's stains). Fair number of parasites present.
(Photomicrograph $\times 580$ approx.).

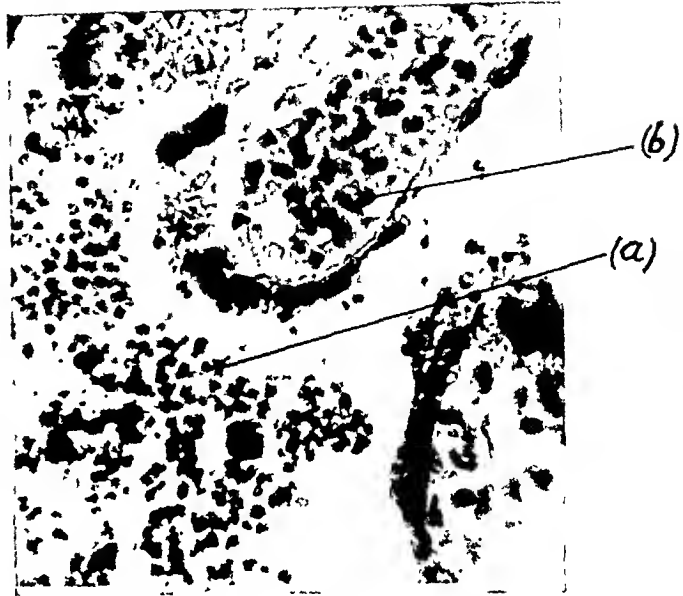


Fig. 3.—Section of placenta (stained with Mallory's iron-haematoxylin and eosin) shows that the intervillous space (a) is packed with infected red cells, while the cells in a blood vessel of a chorionic villus (b) is entirely free from infection.
(Photomicrograph $\times 580$ approx.).

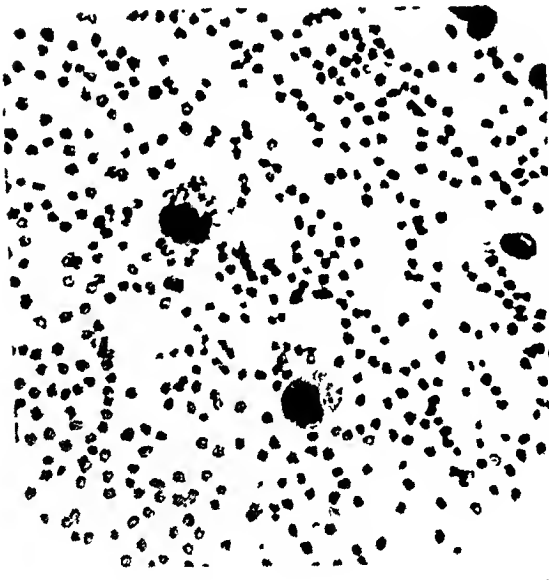


Fig. 2.—Smear of tissue snipped from the maternal surface of the placenta (Giemsa's stain), showing innumerable parasites (growing trophozoites and early schizonts) and some pigmented phagocytes. Most of the parasite-containing red cells are hemolyzed.
(Photomicrograph $\times 580$ approx.).

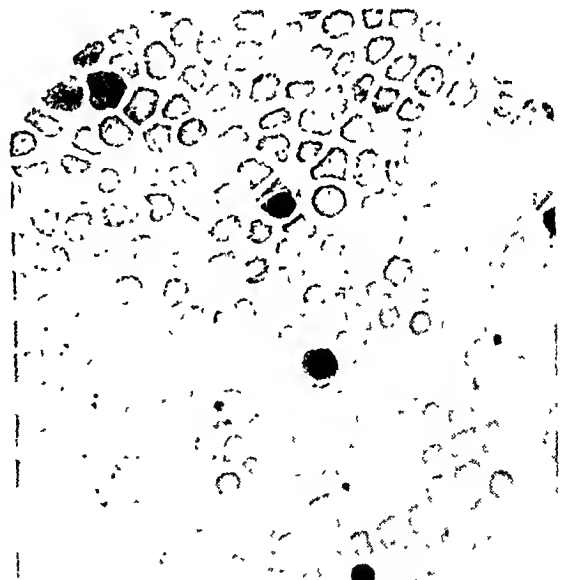
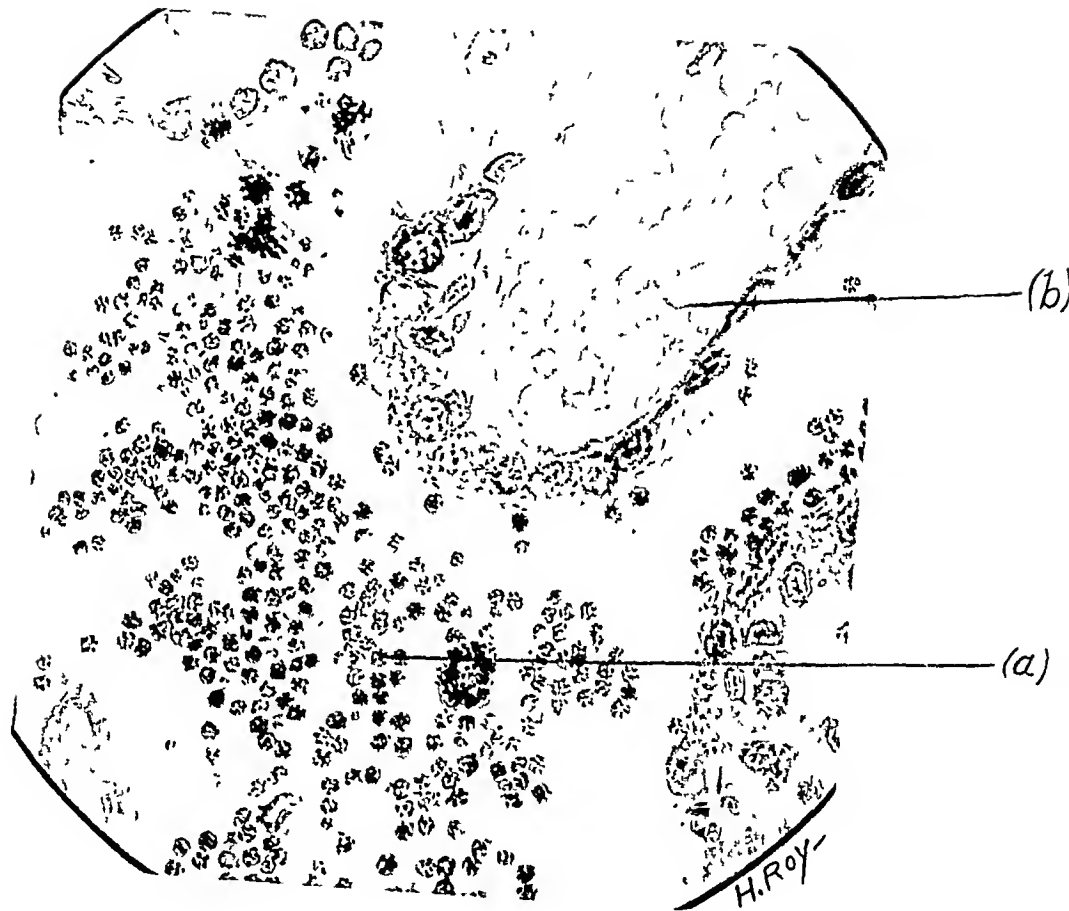


Fig. 4.—Smear of heart blood of the foetus (Giemsa's stain). No parasite or any evidence of malarial infection is present. Nucleated red cells and anisocytosis characteristic of embryonic blood are seen.
(Photomicrograph $\times 580$ approx.).

PLATE XIII



Same as figure 3 in plate XII. Drawn with an Abbe camera lucida at a higher magnification ($\times 790$ approx.)

AN ABDOMINAL TUMOUR CAUSED BY *GNATHOSTOMA SPINIGERUM* (OWEN, 1836)

By SVASTI DAENGSVANG, D.P.H., D.T.M.

From the Department of Pathology, Siriraj Hospital,
Faculty of Medicine, Chulalongkorn University,
Bangkok, Siam

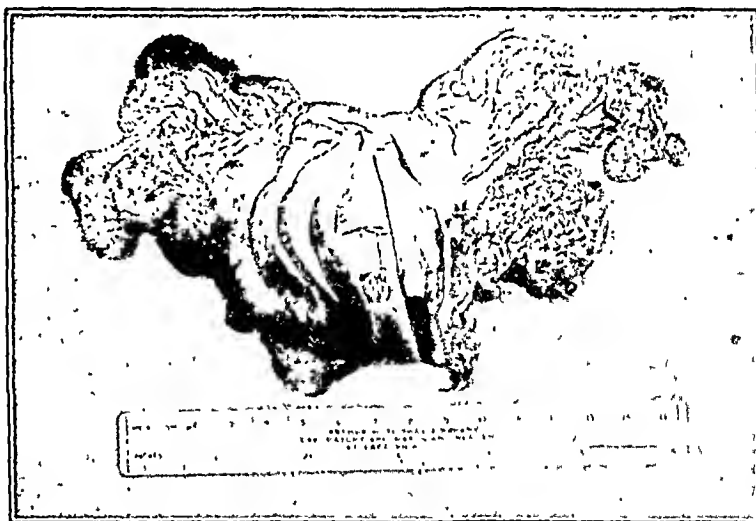
A TUMOUR and a small living round worm were removed by a surgeon from the abdominal cavity of a Siamese female, aged 27, with symptoms of intestinal obstruction and were sent to the Department of Pathology for diagnosis. The pathological examination of the tumour and morphology of the parasite are recorded as follows :—

Macroscopic description.—The specimen consisted of an irregular reddish-yellow firm tumour and a living round worm. The tumour measured $7.0 \times 6.5 \times 3.0$ cm. and was situated in the great omentum below the greater curvature of the stomach. It was apparently covered with smooth dull-looking peritoneum and at one place was overlaid by a few dark-red blood clots. On serial section it was found to be composed of greyish moist firm shiny tissue marked with many small, scattered, yellow, opaque areas and it contained a long distorted channel with the diameter about the size of a pin's head. This channel was filled with brownish turbid exudates and opened to the external surface of the tumour. A few small old hæmorrhagic areas were also observed in the tissue near this channel.

Microscopic examination of the tumour.—The hæmatoxylin-eosin stained sections of the specimen were made up mainly of oedematous cellular-adipose fibrous tissue which was very extensively infiltrated with eosinophiles and some large and small mononuclear cells. In some sections there were a few small irregular spaces filled with degenerated and necrotic leucocytic exudates. The tissue about these spaces was necrotic and more heavily infiltrated with eosinophiles and polymorphonuclear leucocytes.

These channels looked like small abscesses. One edge of the section studied was covered with a thick layer of hæmorrhagic exudate.

Description of the worm.—After careful examination, the worm was identified as an immature female *Gnathostoma spinigerum* having the following structure :—It measures, after fixation, 10.80 mm. in length and 1.04 mm. in width. The anterior end is provided with a pair of trilobate lips and a cephalic bulb which measured 0.36 mm. long and 0.58 mm. wide and is furnished with eight rows of single-pointed spines pointing posteriorly. The eighth row is still in a rudimentary stage. The body is separated from the cephalic bulb by a definite constriction and is transversely striated. The anterior two-thirds of the body are covered with tridentate and simple spines and the remaining posterior third shows none of them. The posterior end of the worm is more or less pointed. The alimentary system consists of a muscular oesophagus which measured 2.6 mm. in length, and an intestine. The latter contains a great amount of dark-red blood and opens into the subterminal anus. The vulva opens on one side of the body at the anterior part of the posterior



half of the worm. A great number of presumably young unfertilized ova are also observed in the bipartite uterus which is coiled up and down inside the body.

Unquestionably, the tumour thus described was formed as the result of the infestation by this worm. It is also interesting to note that to the best of my knowledge this is the first human case of an intraperitoneal tumour caused by *Gnathostoma spinigerum* reported in the literature.

The writer wishes to thank Dr. C. Prommas, head of the Department of Pathology, for his valuable aid and suggestions and is indebted to Dr. Khun Ketudasma for the photography.

(Continued from previous page)

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TREATMENT OF CHOLERA (A NOTE ON THE RESULTS OF TREATMENT BY DIFFERENT METHODS)

By C. L. PASRICHA

MAJOR, I.M.S.

A. J. H. DEMONTE, D.B., I.M.D.

B. C. CHATTERJEE, M.B., D.P.H., D.T.M.

and

A. SAMAD MIAN

(From the Department of Bacteriology and Pathology,
School of Tropical Medicine, Calcutta)

ALTHOUGH in recent years considerable progress has been made in the study of the bacteriology of cholera, very little attention has been paid to the evaluation of the different methods of treatment of this disease that have been advocated from time to time or to the development of new methods of treatment. In this paper are recorded the results of treatment of cholera patients by four methods (calomel, potassium permanganate, essential oils and choleraphage) that have found favour in the hands of different cholera workers, and by M. & B. 693 (2-sulphanilyl-aminopyridine) as a representative of the sulphanilamide group that has given such promising results in a number of bacterial infections.

The different methods of treatment were carried out in the cholera wards of the Campbell hospital during the pre-monsoon epidemic and the experiment lasted for five weeks from the 27th March, 1939. The selection of cases in the different series was made by a system of coloured cards, each colour representing a particular line of treatment. The cards were so arranged that each batch of five new admissions would receive five differently coloured cards. In this way the selection of cases was made without personal bias and was irrespective of age, severity or general condition of the patient.

All the patients treated were suffering clinically from cholera and although in a number of cases the diagnosis was confirmed by the isolation of agglutinable vibrios it was not possible to undertake bacteriological examination in every one. The usual hypertonic and alkaline saline injections and other symptomatic treatment was given as indicated. The different groups received additional treatment according to the following plan :—

(i) Calomel series.—Calomel 1/8th grain was given every half hour to a maximum of eight doses. Children received proportionately smaller doses.

(ii) Potassium permanganate series.—Two enteric-coated pills of potassium permanganate (Parke, Davis & Co.), two grains in each, was given every 15 minutes for the first two hours and then every half hour throughout the acute stage of the disease. Usually 80 pills were given to each case.

(iii) Essential oil mixture series.—The mixture was made up as follows :—

Oil of aniseed ..	5 minims
Oil of eajuput ..	5 "
Oil of juniper ..	5 "
Spirit of ether ..	30 "
Aromatic sulphuric acid ..	15 "

Half a drachm of this mixture in half an ounce of water was given every quarter of an hour to a maximum of 16 doses.

(iv) Bacteriophage series.—One bottle containing 1 ounce of choleraphage was given to each patient in three doses per day.

(v) M. & B. 693 series.—Two tablets of M. & B. 693 three times a day was given for a maximum of four days.

The results obtained are shown in tabular form. In table I is given the mortality in each group without making any corrections. It was felt, however, that there might be loading in certain groups due to the inclusion of cases admitted in a dying condition and other cases which were not strictly comparable. In table II are shown the results of mortality after the following corrections had been made in each group :—

1. Exclusion of patients who died within three hours of admission to the wards.

2. Exclusion of patients below the age of six years or above the age of 50. Both the recovered and the fatal cases of these age groups were eliminated from all series.

TABLE I
Showing the total number of patients treated and the mortality in each group

Treatment	Number of patients treated	Number of deaths	Per cent mortality
Calomel ..	90	17	18.9
Potassium permanganate ..	40	6	15.0
Essential oils ..	47	5	10.7
Choleraphage ..	44	2	4.5
M. & B. 693 ..	50	5	10.0
TOTAL ..	271	35	12.9

TABLE II
The number of cases treated and the mortality in each group after the exclusion of (1) cases dying within three hours of admission and (2) patients less than six years old or more than 50 years old, irrespective of whether such patients recovered or died

Treatment	Number of patients treated	Number of deaths	Per cent mortality
Calomel ..	75	9	12.0
Potassium permanganate ..	37	4	10.8
Essential oils ..	46	4	8.7
Choleraphage ..	43	1	2.3
M. & B. 693 ..	43	4	9.3
TOTAL ..	244	22	9.0

Through some misunderstanding the number of cases admitted into the calomel series was double the number admitted into any of the other series. As the analysis of the figures was made after the completion of the whole experiment this mistake was not noticed during the course of the experiment.

Although the number in each series is small and does not justify the drawing of any definite conclusions, certain suggestions can be made. In table I the only criterion of the results of treatment has been recovery or death. Whether the patient was admitted dying or died within a few hours or whether death occurred from other causes than cholera has not been taken into consideration. All cases are taken as cholera and all deaths as due to cholera. In table II certain selection has been made and this selection is justifiable in a disease so severe and so rapid in its progress as cholera. The results obtained however are similar in both tables.

There is no appreciable difference in the mortality in the series treated with calomel, potassium permanganate, essential oils or M. & B. 693. Rogers (1937) strongly recommends treatment with potassium permanganate on the hypothesis that the toxins of cholera are albuminous in nature and, like those of snake venom, are destroyed by oxidation into non-toxic substances by the action of small quantities of permanganate. The actual results obtained do not show any advantage of the permanganate method of treatment over essential oils or calomel.

Although the only criterion taken in this analysis has been the survival or death of the patients, the general impression obtained during the experiment was that the patients treated with potassium permanganate took longer to recover and there was a tendency for the vomiting to persist longer in this series. Recovery was somewhat slow also in the patients treated with essential oils. The patients treated with divided doses of calomel or M. & B. 693, recovered rapidly and convalescence was uneventful.

The results of cholera phage therapy are striking and are sufficiently encouraging to justify the adoption of bacteriophage as a routine measure in the treatment of cholera and other methods should be compared with the results of bacteriophage therapy. The results of bacteriophage therapy in this experiment are better than those obtained in a previous trial (Pasricha, deMonte and Flynn, 1936). The bacteriophage used in this experiment was prepared by a somewhat modified method in which the strains used for the propagation of bacteriophage were added in groups at hourly intervals to the seed bacteriophage. The bacteriophage was filtered two hours after the addition of the last batch of strains of cholera vibrio.

The importance of this experiment lies in the fact that the different methods of treatment

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COARCTATION OF THE AORTA

By T. K. RAMAN, M.D., D.T.M. (Cal.)

(From the Department of Medicine, Medical College and King George Hospital, Vizagapatam)

By coarctation of the aorta is meant a condition in which there is narrowing or complete obliteration at or below the isthmus of the aorta; that part of the aorta which extends between the origin of the left subclavian artery and the point of insertion of the ductus arteriosus.

Bonnet classifies coarctation of the aorta under two headings :—

(1) *Infantile type* in which there is a diffuse narrowing of the isthmus, and is usually associated with other congenital abnormalities. The ductus arteriosus is patent. In some cases the stenosis may be only of a moderate degree, while in others the isthmus may be absent altogether or reduced to a thin fibrous cord.

(2) *Adult type* the condition usually occurs after infancy and the constriction is at or below the insertion of the ductus arteriosus. Blood supply to the lower extremities is maintained by collateral circulation through the upper intercostals, internal mammary and the posterior seapular vessels. The ductus is usually obliterated but occasionally it may be patent.

Embryology

The aorta and its branches are developed from the embryonic vessels consisting of a dorsal aorta, a ventral aorta and six pairs of aortic arches.

(1) First and second pairs connect the unfused portion of the dorsal with the unfused ventral aorta.

(2) Third, fourth and sixth pairs arise from the truncus arteriosus and join the unfused portion of the dorsal aorta.

(Continued from previous column)

were carried out at the same time, during the maximum incidence of the disease, in the same ward and amongst people of more or less the same strata of society.

Summary

1. Two hundred and seventy-one cholera patients were treated by five different methods during a period of five weeks when the incidence of the disease was high.

2. The methods employed were (1) divided doses of calomel, (2) potassium permanganate, (3) essential oils, (4) bacteriophage and (5) M. & B. 693.

3. The selection of cases into the different series for treatment was based on admission and not on any personal selection.

4. The results obtained by the different methods of treatment show that bacteriophage gives the best therapeutic results.

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(3) Fifth pair arises from the ventral aorta and joins the sixth aortic arch. (This pair does not take any prominent part in the development of the aorta.)

As development proceeds, the first two aortic arches disappear, the pulmonary arteries arise from the corresponding sixth aortic arch; the dorsal portion of the right sixth arch, dorsal roots of the third and the dorsal roots of the right sixth aortic arches disappear.

In coarctation of the aorta the lesion is restricted to the dorsal root of the fourth left aortic arch lying between the origin of the left subclavian and the insertion of the sixth left aortic arch at its root (ductus arteriosus).

The condition was first reported by Paris in 1789 (Abbott, 1927); from a review of the literature, Abbott collected 237 cases, 82 of which were of the infantile type and 155 of the adult type. Blackford's review of the literature brings up the number to 127 of the infantile type and 196 of the adult type from post mortems alone.

Coarctation of the aorta has been diagnosed clinically in 78 cases and the diagnosis was confirmed by post mortem in 21 cases.

Sheldon (1932) described a case in a small boy of 12 years with all the clinical signs of coarctation of the aorta.

Lichtenberg and Gallagher (1933) reported a case in a young girl of 12 years, who came under their observation in 1930. She had all the clinical signs of coarctation of the aorta, and a hemiplegia of the left side as the result of rupture of a cerebral aneurysm.

Wilkinson (1933) presented two cases of coarctation of the aorta before the Royal Society of Medicine, one in a small girl of 4 years and 2 months; and the other in a boy of 14 years. The first child had a blood pressure of 180 systolic and 120 diastolic and very feeble pulsation in the iliac arteries, but there was no evidence of collateral circulation. In the second case there was collateral circulation and a blood pressure of 190 systolic and 130 diastolic in the upper extremities and no pulse in the legs.

Lewis (1933) reported 9 cases of coarctation of the aorta of the adult type including 3 cases where post mortem was held.

Shapiro (1933) reported the case of a boy of 7½ years which was followed for 10 years. The boy was first examined in 1923 and he was again examined in February 1924. At this time a diagnosis of juvenile hypertension in children was made. The condition was later on diagnosed as coarctation of the aorta. X-ray showed typical erosion of the ribs.

Evans reported 28 cases of coarctation of the aorta.

Pierce (1934) reported a case in an Italian labourer of 35 years. This patient died of rupture of a mycotic aneurysm of the aortic valve. The aorta was constricted 18.2 cm. above, beyond the cusp. There was no remnant of the ductus arteriosus.

Levine (1934) reported a case of cardiac hypertrophy with coarctation of the aorta of the infantile type.

Ballantyne (1935) reported 3 cases, two of which showed complete obliteration of the aorta and one moderate obliteration. The ductus arteriosus was patent in both cases of complete obstruction, and closed in the one of moderate coarctation. All these cases were of the infantile type.

Farris (1935) reported 2 cases. One was verified by post mortem.

Stott (1935) described a case in a female of 41 years without visible or palpable evidence of collateral circulation. The heart was dilated, systolic murmur was heard all over the course of the internal mammary arteries, murmurs were heard posteriorly over the apices of the lungs, blood pressure in both the arms was 220/130. There was only faint pulsation of the abdominal aorta and of the femoral arteries. X-ray showed erosion of the ribs.

Cookson (1936) reported a case in a woman of 38 years with toxic goitre.

King (1937) after a review of the whole literature has collected 175 cases in which blood pressure was taken. From the available literature one was able to collect only these cases.

As far as I am aware the condition has not been described so far in India.

Case report.—A male, aged 30 years, was admitted into a medical ward of the King George Hospital on 6th February, 1937, with breathlessness on exertion, pain in the legs and enlarged spleen of one year's duration. He is married and has two children, the first aged five years and the second three.

Examination.—A fairly well-built individual slightly anæmic with an icteric tinge in the conjunctiva, slight œdema of the lower extremities, no cyanosis. There is well-marked pulsation of the vessels of the neck. Prominent pulsating tortuous arteries can be seen on the vertebral border of the scapula and in the axillæ of both sides (figure 1). The apex beat is not visible but palpable in the fifth interspace just external to the left nipple. A systolic murmur is heard all over the chest in front and behind but is much clearer over the tortuous and dilated scapular vessels. Pulse 66 per minute with slight irregularity (auricular extra-systoles). Blood pressure 152/68 in the upper extremities and 86/68 in the lower extremities. There is very feeble pulsation in the abdominal aorta and practically no pulsation at all in the femoral and popliteal arteries. The spleen is enlarged to two finger-breadths below the umbilicus. Liver not enlarged.

Respiratory system—nothing abnormal.

Blood examination.—Red cells 1.3 million, total leucocytes 4,000 and hæmoglobin 30 per cent.

A smear showed slight anisocytosis and poikilocytosis, a few normoblasts.

Halometric reading—4.6.

Van den Bergh reaction—direct: positive delayed; indirect: positive.

Bilirubin content—2.4 units.

Blood Wassermann—(+).

Urine showed a trace of albumin; no casts. Blood urea—33 mgm.

Kidney function was estimated and showed a maximum clearance of 66.5 per cent.

Fundus was normal. There was no dilatation or tortuosity of the vessels.

X-ray of the chest showed left ventricular hypertrophy—boat-shaped heart and evidence of myocarditis. Ribs show well-marked erosion (Rossler's sign). Ascending aorta normal, not dilated; the descending aorta was not visible (figure 2).

Electrocardiogram showed regular sinus rhythm; P was normal; P-R interval was normal; left axis deviation. T+++; auricular premature contraction in lead 2; low voltage in lead 3. In lead 3 S progressively large for three beats. The clinical significance of the progressive increase in amplitude of the three beats is not known (figure 3).

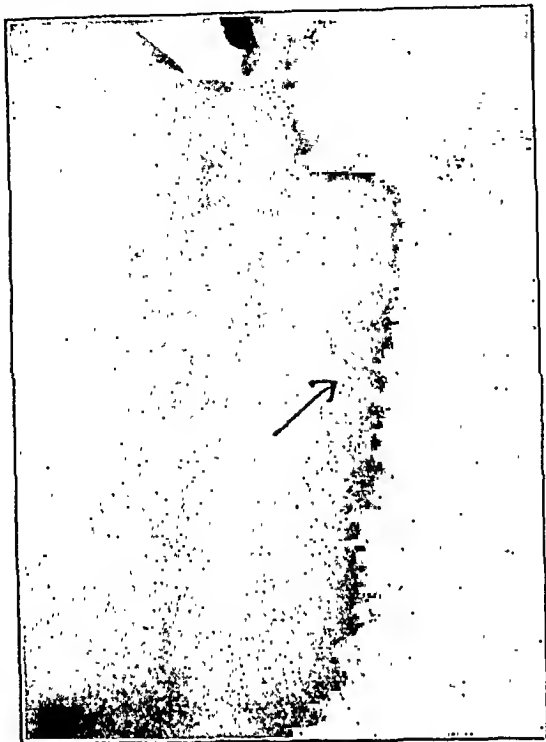


Fig. 1.—Showing dilated and tortuous scapular vessels on the right side.

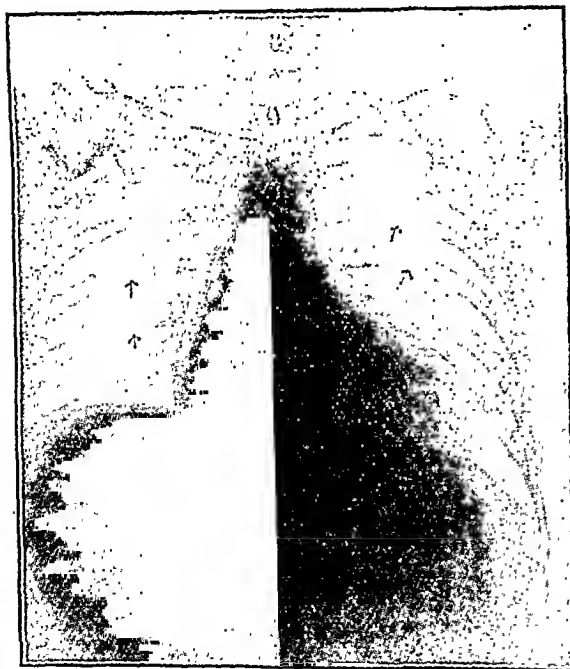


Fig. 2.—X-ray of the heart taken on 8th February, 1937; shows enlarged heart; descending aorta not visible; myocarditis. The erosion of the ribs (Rossler's sign) is shown by arrows.

He was kept in the hospital till the 17th March, 1937, and was discharged. The patient was asked to report and he was again examined on the 9th October, 1937.

This time the heart failure symptoms have disappeared. Spleen has reduced in size. The pulsating tortuous arteries are not so prominent as before. Systolic murmur is present all over the chest but not so clear as before. Blood pressure 166/88 in arm and 106/86 in lower extremities. Pulse was slow this time, 50 per minute. X-ray shows diminution in size of the heart.

Blood urea 48 mgm. Kidney function showed a maximum clearance of 35.7 per cent.

An electrocardiogram shows sinus bradycardia.

This case shows all the signs and symptoms of coarctation of the aorta; prominent pulsating tortuous, scapular and axillary vessels; absence of pulsation of lower extremities; slightly raised blood pressure in the upper extremities and low blood pressure in the lower; presence of systolic murmur all over the chest and x-ray evidence of erosion of the ribs. Deficient blood supply to the lower extremities has in no way interfered either with his kidney function or his reproductive function since the urea clearance is practically normal and he has two children one of 5 years and the other of 3 years.

Acknowledgments

My thanks are due to Dr. G. Dinker Rau, Dr. P. Kesavaswamy, Dr. V. K. Narayana Menon and to Dr. C. Abbu.

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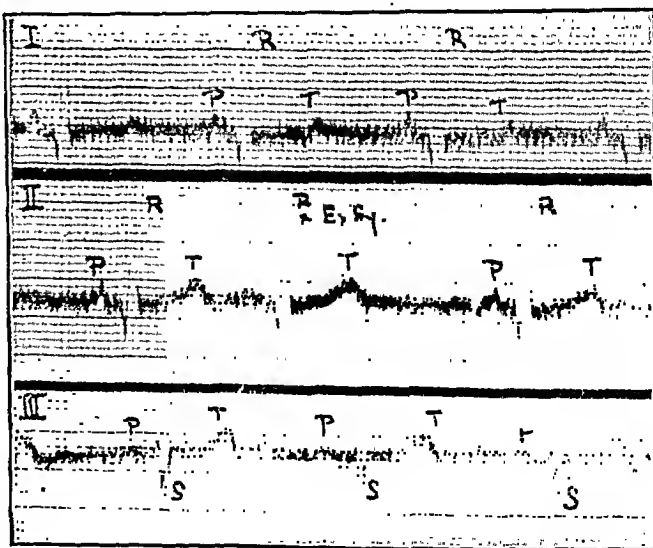


Fig. 3.—Electrocardiogram taken on 11th February, 1937. RSR; P normal. PR normal; VPL; T+++; auricular extra-systoles in L2; low voltage in L3.

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THROMBO-ANGIITIS OBLITERANS

REPORT OF A CASE TREATED BY LUMBAR
GANGLIONECTOMY

By MIN SEIN, M.B. (Cal.), M.R.C.P. (Lond.)

CAPTAIN, I.M.S.

*Second Physician, General Hospital, Rangoon, and
Lecturer in Medicine, Burma Government Medical
School, Rangoon*

IN 1936 I published a report of a case of thrombo-angiitis obliterans which had reacted favourably to the operation of peri-arterial sympathectomy. The cure has been maintained so far and might be considered satisfactory. This case proves the utility of the operation in certain milder types of the disease.

More recently I saw a patient in an advanced stage of the disease where the radical operation of lumbar ganglionectomy had to be performed.

The patient, a Burmese male, aged 26 years, was admitted to the Civil Hospital, Toungoo, on the 2nd January, 1937, with the following history:—Twenty days prior to admission an ulcer appeared on the tip of the right great toe. This had spread upwards and involved the whole of the toe, which was in a condition of moist gangrene. The patient also suffered from excruciating and throbbing pain and had been unable to sleep. He had tried all kinds of local remedies but ultimately decided to get admitted into hospital on account of the unbearable pain. The patient had had the left leg amputated just below the knee by another surgeon two years previously on account of a similar condition spreading upwards from the toe and involving the whole foot. The patient clamoured for a similar operation for the remaining limb. He was a moderate tobacco smoker and a teetotaler.

The man was a picture of misery with sunken cheeks and eyes and dry lips due to pain, loss of sleep and loss of appetite. Physical examination was negative, except that no pulsation could be felt in the posterior malleolar and dorsalis pedis arteries. The limb felt cold and the big toe had the typical appearance of moist gangrene. There was no line of demarcation.

The limb was kept warm and an attempt was made to desiccate the ulcerated parts by frequently dabbing off the secretions and the application of methylated spirit. Hypnotics were administered at night. As there was no improvement, a femoral periarterial sympathectomy was done on the 8th January, 1937, with the hope that at least pain might be relieved. It was a forlorn hope, as one might expect from the advanced stage of the disease. However, the wound became fairly clean and a line of demarcation appeared. The big toe was amputated at the metatarso-phalangeal joint on the 19th January. The wound turned septic and gangrene spread upwards on the dorsum of the foot. The patient was calling for an amputation to relieve

him of the unbearable pain, which was as bad as before. It was decided to do lumbar ganglionectomy as a last resource. Under spinal anaesthesia trans-peritoneal lumbar ganglionectomy was performed on the right side through a right paramedian incision and the 2nd to 4th ganglia resected with their connections, on the 28th January. Within 24 hours pain was relieved and the limb appeared warmer. The patient developed fever with diarrhoea and bronchitis for ten days after the operation. The septic wound discharged pus for a considerable period and after a protracted convalescence, the patient was discharged on the 29th August, 1937, with the leg saved, the ulcers healed up and an improved general condition.

Commentary.—The lesson to be learned from the above case is that when an advanced case of thrombo-angiitis obliterans is encountered, it is better to treat it by the radical operation of ganglionectomy straight away.

I have seen two other cases amongst Burmans, besides the above two, which show that the disease must be fairly common in Asia. Therefore it may be worth while to give a résumé of the disease.

Ætiology.—Mahorner (1933) regards it as one of the most dreadful diseases which attack men. Lack of precise knowledge of the ætiology renders it more fearful. Yet certain associated factors are well recognized. For instance, it appears to be a disease almost exclusively of the male sex. Whilst Buerger, who suggested the name, thought the disease to be peculiar to Jews, it has become increasingly evident that no race is exempt. I have personally come across four cases of which the first was Chinese and the others were Burmese; all of Mongolian origin. The association of tobacco, particularly cigarette smoking, as an ætiological factor is stressed by most authorities and Silbert (1935) described a large series of cases of which there was no non-smoker. He attributed the disease to constitutional susceptibility to tobacco rather than excess, as having an important bearing on the incidence of the disease. This may partly explain the apparent rarity of the disease in Burma, as the majority of men and women smoke tobacco in this country. Perhaps a better knowledge of the disease would enable more cases to be recognized. Allen and Lauderdale (1936) put in a suggestion that the disease might be infectious in nature, as has also been suggested by Mahorner (1933) and that the transmissible agent was probably bacterial. They described a case where there was evidence of accidental transmission of the disease from man to man, e.g., a surgeon having developed the disease six months after receiving a prick on a finger whilst amputating the limb of a patient with thrombo-angiitis obliterans.

Clinical features.—Whatever the nature of the exciting cause, the underlying pathological lesions in the vessels involve two factors, e.g., ischæmia and inflammation of the deep-seated vessels, especially of the extremities, usually the legs. The arteries as well as the veins are involved in the process resulting in thrombosis, obliteration of the lumen, and subsequently

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ischæmia, local syncope and death of the parts affected.

Goldsmith and Brown (1935) divide the pain as being due to several causes arising from the blood vessels, e.g., from spasm or stretching, infection, that induced by exercise, that occurring at rest, pain of ulcer or gangrene, pain of inflammatory lesions of the blood vessels and pain of complete occlusion and ischæmic neuritis. Wheeler has aptly described the condition as a pre-senile, non-syphilitic, non-embolic arterial and venous obliteration. Pain is the most prominent feature of the disease, and may be mild as when occurring only after exercise (intermittent claudication), or it may be persistent, severe and unbearable. The onset of pain or discomfort may draw the patient's attention to the disease, or the occurrence of indolent ulceration or spreading gangrene after very slight trauma to the toes which sooner or later becomes associated with pain. Clinically the condition can be recognized by the absence of the pulse in the affected arteries, and the signs of deficient vascular supply in the limb such as cyanosis, when the limb is kept pendant, blanching on being elevated, and the slow return of colour on being lowered, demonstrating the presence of both arterial and venous obliteration. Whilst the disease primarily affects one lower limb, it tends to involve the other limb as well. The disease might also affect the upper limbs. More recently Cohen and Barron (1936) have discussed the possibilities of involvement of the abdominal vessels, bringing the disease in line with thrombo-angiitis migrans.

Treatment.—The treatment can only be symptomatic, but there are advocates of both conservative and radical methods of treatment. It is generally agreed that tobacco should be given up altogether. Eradication of focal sepsis, the care and cleanliness of the feet, and avoidance of trauma are important points to remember. Barker (1935) has rightly stressed the extreme danger of minor injuries in vascular diseases such as thrombo-angiitis obliterans and arteriosclerosis.

Samuels (1934) believes in extreme conservatism, and adduced impressive figures in support of his claims. In a series of 300 cases, amputation was necessary only in one case. In addition to the above precautions he enjoined rest in bed with legs kept horizontal, and intravenous injections. He deprecates sympathectomy and ganglionectomy altogether. Other conservative measures that have been recommended are:—

(1) Application of heat, radiant or diathermic, to the limbs.

(2) Keeping the forearms in hot water (temperature 43° to 45°C.) for half an hour raises the temperature of the toes to above 31.5°C. and is assessed by Landis and Gibbon (1933) as being of the same value as T.A.B. vaccines intravenously.

(3) Typhoid vaccine intravenously, beginning with a small dose.

(4) Hypertonic salines are given by many authorities. Having treated 524 cases by this method, Silbert (1935) considers the results convincing. He injects 150 to 300 c.cm. of 5 per cent sodium chloride solution in freshly distilled water by gravity method. He gives three, two, and then one injection a week. As it is likely that the injections will be followed by rigor, it is not advisable to follow the advice of frequent injection. Samuels (1936) also recommends this procedure.

(5) Takáts (1934), Hermann and Reid (1934), Landis and Hitzrot (1935), and Collens and Wilensky (1936) recommend intermittent negative pressure where there is no actual inflammation or gangrene. Rest-pain, intermittent claudication and cyanosis are relieved and indolent ulcers are healed.

(6) Artificial fever therapy. The injection of saline and typhoid vaccines have this end in view.

(7) Administration of vasodilators such as theobromine and its salts [Scupham (1934), Scupham and Takáts (1935)] is also recommended but they do not seem to have lasting value.

(8) The use of sedatives and opiates during conservative treatment.

Radical treatment includes

(1) *Periarterial sympathectomy.*—This method seems to have gone out of favour, but a few cases are on record, as having derived permanent benefit by this operation.

(2) *Lumbar ganglionectomy.*—Most authorities are now in favour of this operation [Telford and Stopford (1933), Brown (1934), Telford (1937)]. On the other hand Fraser (1935) does not believe that the operation has any permanent effect upon the progress of the disease.

The operation is done transperitoneally by anterior approach with the patient in the Trendelenburg position and sympathetic ganglia L2 to L4, with intermediate connections, are removed on both sides. The results appear good but the operation is not easy and requires a good knowledge of anatomy.

(3) Sooner or later the onset of gangrene forces one's thoughts to the question of amputation of the affected limb. Ganglionectomy has lessened the incidence of amputation but there are some cases where the operation cannot be avoided.

It will be noted that whilst protagonists of each line of treatment might extol it to the exclusion of others, it is advisable to remember, that in any particular case more than one might be necessary.

Summary

(1) A case of thrombo-angiitis obliterans treated by lumbar ganglionectomy is described.

(2) A general summary of the disease is appended to draw the attention of the medical

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TUMOURS OF THE UPPER JAW AND ITS IMMEDIATE NEIGHBOURHOOD

By V. M. KAIKINI, B.A., F.R.C.S. (Edin.)
King Edward Memorial Hospital, Bombay

THE growths that are commonly found in the upper jaw are the following :—

(1) *Epulis*.—The majority of these tumours grow from the peritosteum, periodontal membrane, or endosteal lining of the alveolus. These are of three kinds :

(a) *Fibrous epulis* is a fibroma growing from the periosteum and may be associated with a carious tooth. It is in the form of a red fleshy tumour painless and lobulated, covered by an intact mucous membrane.

(b) *Simple granulomatous epulis* consists of a mass of granulation tissue, inflammatory in origin, associated with a carious tooth or a necrosed portion of the jaw bone. It is of the nature of a polypus.

(c) *Malignant epulis* are of the nature of osteoclastoma or fibrosarcoma, of the periosteum, or periodontal membrane. They grow more rapidly than the other two varieties, and do not as a rule spring up between two teeth and form a hard elastic red sessile swelling.

(2) *Leontiasis osseum* is supposed to be an inflammatory overgrowth of the bones of the maxilla due to chronic sinus infection, and it

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profession on account of the prevalence of the disease in Asia.

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occurs in young adults giving rise to great pain. This condition is not confined to the upper jaw only, but spread to the facial and cranial bones as well.

(3) *Myelomata* arise within the alveolar process. The alveolar process becomes swollen and expanded with a dusky colour, giving rise to egg-shell crackling. The growth may fungate. They behave like malignant tumours.

(4) *Epithelial odontomes* are sometimes found in the upper jaw. They are multilocular and on account of the bony capsule, and the early degeneration of the epithelium, they have little tendency to spread.

(5) *Dentigerous cysts* are of two varieties. The commonest one is cystic only consisting of an outer bony shell of varying thickness, and an inner membranous one. An undeveloped tooth is found inside the cavity. They commence early in life and a tooth is found missing. In the other variety occurring in older patients, solid growths, sarcomatous in nature, may be found.

(6) *Dental cysts* are in connection with carious teeth, and suppuration with sinus formation is common. They are painless and slow growing.

(7) *Enchondromata* and *osteomata* have been reported; but these are rare.

(8) *Sarcoma* is more common than carcinoma and is either round-celled or spindle-celled. It grows either from the back part of the maxilla in the spheno-maxillary fossa, within the antrum, or from the front wall of the maxilla.

(9) *Carcinoma* usually commences in the epithelium of the gums or palate and invades the jaw secondarily. In this case it is squamous celled. In some cases it grows from the mucous membrane of the antrum when it is columnar celled.

Papillary leucoplakia of the mucous membrane of the upper jaw is potentially malignant. Adenocarcinoma of the mixed tumour type usually occurs posteriorly in the upper jaw and palate, and as a rule presents a non-ulcerated smooth hard surface.

Clinical signs and symptoms of malignant tumours of the upper jaw

Patients with a constant complaint of pain and uneasiness in the upper jaw or in the face, whose symptoms have been of short duration and who state that the pain or uneasiness is made worse by lying down, should be carefully examined to exclude malignant tumours, as the cause of the pain.

The majority of the cases that come to the surgeon either for diagnosis or treatment come late. A good many of these are treated for tooth or sinus trouble, and when the pain and swelling are found to increase the help of the surgeon is sought.

When the tumour grows from the anterior aspect of the maxilla the cheek is found to be pushed forward, in the beginning. Later on the

mouth and orbit are invaded, and the soft tissues of the cheek undergo infiltration. If the tumour starts from the periosteum of the posterior surface of the maxilla, it grows in the sphenomaxillary fossa and invades the orbit from behind. The eyeball is pushed forward and the nose is invaded in later stages. When the tumour commences in the antrum the first symptom is pain in the fifth nerve, and the walls of the antrum are found to bulge in all directions; the palate is depressed, the eyeball is pushed forward and upward and the cheek is found to be prominent. Eggshell crackling may be present over the swelling. There will be nasal obstruction with considerable discharge and epiphora due to the obstruction of the lachrymal duct. Puncture of the antrum will bring out blood but no pus.

Innocent swellings of the maxilla; the mycoids, dental or dentigerous cysts and empyema of the antrum may be mistaken for these tumours. But none of these conditions give rise to the pain, steady progress, infiltration of tissues, bleeding and fungation that are seen in malignant tumours.

Below are given the records of thirteen cases which were operated upon for malignant tumours of the maxilla. The majority of these cases were sarcomatous in nature, and had come in a fairly advanced condition.

Case 1.—Male, aged 35 years, admitted in October 1927 with a big round swelling on the anterior aspect of the left maxilla. There was a good deal of pain with nasal discharge and epiphora. History was of about one year's duration. Being the first operation of its kind done by me, the classical textbook methods of excision of the maxilla were tried. The left external carotid artery was tied, a laryngotomy opening made, and a laryngotomy tube was inserted through which chloroform was administered. Unfortunately the patient stopped breathing before the skin flap had been fully reflected, and his condition looked rather bad. So the skin flap was stitched and the operation was not proceeded with. The patient was sent back to the ward where he fully recovered from the effects of the operation. The second attempt to excise the maxilla was made after about fifteen days. Chloroform was administered by the open method, the laryngotomy tube being dispensed with. The usual incision extending upward from the middle of the upper lip along the outer margin of the left ala nasi, to half an inch below the inner canthus and then horizontally to the right malar bone was made, and the skin flap reflected. The whole of the maxilla was removed. It came away in three pieces, as the tumour had caused a good deal of destruction of the anterior and lateral walls of the bone. The gap was packed with gauze and the flap stitched in place. Bleeding was profuse and had to be stopped by ligaturing and gauze pressure. Convalescence was smooth. The patient complained of double vision for about a month. But the sight was normal after that period. The patient was reported to be doing well four years after the operation. The tumour was sarcomatous in nature.

Case 2.—Female, aged 23 years, admitted in December 1928, with a small swelling half an inch in diameter on the hard palate on the left side, near the alveolar margin. She at first showed it to her family doctor, who thinking it to be an ordinary abscess incised it. This gave rise to profuse bleeding and he suspected something serious, so she was advised to see a surgeon. After admission into the hospital, a section was taken from the growth, and examined. The report was 'A

rapidly growing fibroma with hæmorrhages—a fibrosarcoma'. The operation was done under general chloroform anaesthesia without a preliminary tying of the carotid artery or the use of the laryngotomy tube. The maxilla was removed in the usual way and it came out in one piece. The antrum was found to be occupied by a fairly large growth, much larger in size than the portion projecting from the hard palate. The patient's convalescence was uneventful. She was seen in September 1938, with a mild attack of appendicitis, for which she underwent an operation. The defect in her face does not cause her much inconvenience, she is able to chew her food without any difficulty, and has got an artificial denture to close the gap left after the operation. The deformity in the face also is not very disfiguring (figure 1).



Fig. 1.—Case 2. Fibro-sarcoma right maxilla. Photo taken in 1938. The right maxilla was completely removed. The deformity is very slight.

Case 3.—Female, aged 25 years, admitted on 15th July, 1930, with a papillomatous growth of the hard palate extending to the adjoining portion of the cheek. Two years previously the growth had been removed by diathermy, but had recurred. Pathological examination report of the growth was 'Papilloma probably becoming malignant'. One per cent novocain with adrenaline was injected deep into the tissues at a point half an inch in front of the margin of the opening of the external auditory meatus, thus blocking the branches of the fifth nerve in the sphenomaxillary fossa. Novocain was injected subcutaneously along the margins of the maxilla and deeply under the periosteum of the interior plate of the orbit. The patient developed good anaesthesia, and the maxilla was removed completely. The papillary growth on the adjoining portion of the cheek was also dissected out. The patient had no shock and bore the operation very well, there being very little bleeding. She was discharged in good condition. The further history could not be traced.

Case 4.—Male, aged 45 years, admitted on 10th November, 1930, with a fairly big hard fungating tumour, sarcomatous in nature on the right side of the hard palate encroaching a little on the left side. Anaesthesia was induced with novocain injected as above, and the maxilla was removed in pieces, with the patient in a semi-reclining position. The bone was completely

disorganized by the tumour. There was profuse bleeding but the patient stood the operation very well, and was discharged with the wound nicely healed. He did not report himself again, but most likely the tumour recurred in the adjoining region, as it was already too far advanced when the operation was done.

Case 5.—Male, aged 70 years, admitted on 24th January, 1931, with an advanced sarcomatous growth of the right maxilla. The patient first noticed a painless swelling of the maxilla which was diagnosed by his physician as malignant and he was advised deep x-ray treatment. He did not take the treatment but went on applying some ointment locally. The skin of the cheek was infiltrated and oedematous. The hard and soft palates on the right side were involved. The maxilla was removed under local anaesthesia. The growth was found to have invaded the base of the skull, so complete eradication was impossible. The wound healed completely except for a small opening in the skin of the cheek. Shock was practically absent and the patient was discharged free from pain and was advised radium treatment, for the portion of the growth which could not be removed. He was reported to be alive and fairly comfortable six months after the operation. Nothing was heard of him after that.

Case 6.—Male, aged 21 years, was admitted on 7th March, 1933, with a big tumour of the left maxilla of six months' duration. The swelling was prominent anteriorly and inferiorly on the hard palate where it was irregular and granular in appearance. The whole maxilla was removed by the method described above, under local anaesthesia. The severe pain complained of by the patient completely disappeared and he was discharged with the wound nicely healed. The tumour was sarcomatous in nature. Nothing further was heard of the patient.

Case 7.—Male, aged 38 years, admitted on 5th September, 1934, with a big fungating ulcer on the hard palate, about two inches in diameter, dark brown in colour, extending to within half an inch of the pillars of the fauces. About two months previously the patient noticed a small ulcer on the hard palate which was diagnosed as gummatous by his doctor, and he was given antisyphilitic treatment. But the ulcer went on increasing in size and severe pain, radiating to the ear started and the upper teeth on the left side became loose. At the same time a swelling appeared on the cheek. The maxilla was removed under local anaesthesia. The tumour was carcinomatous in nature and had involved the margins of the orbit and the base of the skull. The patient was discharged with the wound completely healed and was advised deep x-ray treatment. Pain had completely disappeared. He returned about ten months later with the left eye swollen, red, and protruding. There was no pain but the tumour was reappearing at the base of the skull. He died about four months later.

Case 8.—Male, aged 45 years, admitted on 3rd November, 1936, with a tumour, carcinomatous in nature, in the right maxilla and involving the mucous membrane of the cheek. Being an advanced case the maxilla was removed piecemeal under local anaesthesia and the ulcer on the cheek dissected out with a diathermy knife. The wound healed by first intention, and the patient was discharged. He returned after about four months with the tumour recurring in the eye.

Case 9.—Male, aged 48 years, admitted with a large sarcomatous tumour involving the right maxilla, and extending to the lateral wall of the pharynx, behind the tonsil. The patient gave a history of only three months' duration. The maxilla was removed under local anaesthesia, but the patient died of shock about eight hours after the operation.

Case 10.—Male, aged 60 years, admitted on 29th March, 1938, with a swelling on the left maxilla and inability to swallow. History was of six months' duration, and the trouble started with bleeding from the nose. The vision in the left eye was defective. There was a fungating growth on the hard palate on the left side and the alveolar process was also invaded. It was an advanced case. The maxilla was removed under local anaesthesia, and it was found that the tumour had

gone beyond the posterior wall of the maxillary antrum. The patient was discharged with the wound completely healed, and was advised deep x-ray treatment. He returned after about four months, and on examination a carcinomatous ulcer was found in the region of the pterygoid fossa. The patient was not seen after that.

In the three cases quoted below the maxilla was removed for eradicating tumours of the nasopharyngeal region. The majority of these tumours usually start from the base of the skull—from the basisphenoid or basioccipital. Less frequently they may start from the pterygoid fossa and adjacent plates or from around the posterior nares.

Case 11.—Male, aged 18 years, admitted on 26th March, 1936, with a tumour extending from the nasopharynx on the right, to the maxilla and pushing the cheek forward. Both the hard and soft palates were pushed downward. A hard nodular mass was seen in the right nasal chamber. There was proptosis of the right eyeball. Tumour bled easily when touched. Deep x-ray had been tried without any benefit. The condition of the patient was very miserable on account of pain and difficulty in deglutition, and he was begging to have an operation done on him. Under local anaesthesia both the external carotid arteries were tied and the right maxilla was completely removed. The tumour was soft and vascular, and was removed partly with scissors and partly by enucleation. This produced formidable bleeding and the patient died soon after the operation. The tumour was of the nature of a fibrosarcoma.

Case 12.—Male, aged 18 years, admitted on 21st April, 1936, for inability to swallow solid food, tinnitus right ear, and difficulty in breathing. There was a hard round tumour occupying both the lateral walls of the pharynx, and the base of the skull. The soft palate was pushed forward. There was ptosis of the right upper eyelid. Aural examination report was 'Cochlear division normal, equal both sides. Right membrane hyperæmic without bulging. Tinnitus could be accounted for by hyperæmia'. History was of four months' duration. Severe pain was present in the occipital region. The right maxilla was removed under local anaesthesia, which gave good access to the nasopharyngeal region. The tumour was a big one and was attached by a broad base to the posterior and both the lateral walls of the nasopharynx. The mucous membrane covering the tumour was separated as much as possible. It was adherent and very much thickened. The tumour was found to be very hard and fibrous in nature. It was removed in pieces partly with nibbling forceps and partly with the diathermy knife. There was very little bleeding throughout the operation. The patient was completely relieved of his dyspnoea, dysphagia and other distressing symptoms, and was discharged on the eighteenth day after the operation. By that time the ptosis of the eyelid had considerably improved.

Case 13.—Male, aged 25 years, admitted on 14th August, 1938, with a big growth filling practically the whole of the nasopharynx, which prevented him from breathing and swallowing freely. The growth was soft and the patient used to pluck out pieces from the tumour which allowed him to breathe and swallow a little more freely. This used to give rise to a little bleeding which stopped easily. The patient was in great distress on account of the dyspnoea and difficulty in swallowing. Tracheotomy had to be done to relieve the difficulty in breathing. The right maxilla was completely removed under local anaesthesia, and the growth was fully exposed. It extended from the roof of the pharynx to both the lateral walls and on the right side had extended to the epiglottis. It was very soft and polypoid in nature and was removed partly with scissors and partly with the fingers. There was a fair amount of bleeding which was easily stopped. The wound was packed with acriflavine gauze. The patient was very much relieved and within a couple of hours after the operation helped himself to a large amount of orange

juice, although some of it regurgitated through the nose. The patient was discharged in good condition. He reported himself in October 1938 and a small nodule was found growing from the site of the old tumour,



Fig. 2—Case 13 Naso-pharyngeal tumour Patient one month after the operation. The scar on the cheek is clearly seen.

for which he was advised deep x-ray treatment. The tumour was found to be a fibroma on pathological examination. This tumour is locally malignant and tends to recur (figure 2).

Summary

1. Out of the thirteen cases of removal of the maxilla, ten were for malignant growths in the maxilla itself, and three for growths in the naso-pharynx.

2. Altogether there were two operative deaths, in cases which were very far advanced.

3. Out of the ten tumours in the maxilla four were carcinomatous in nature, and the rest sarcomatous. Out of the three nasopharyngeal growths one was a sarcoma, and the rest were fibromas.

4. Out of the thirteen operations, only the first two were done under general anaesthesia. In only two were the external carotids tied. All the other operations were done under local anaesthesia without the preliminary tying of the external carotid arteries.

5. In all the operations done under local anaesthesia shock was practically nil, and anaesthesia was perfect.

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THE VITAL CAPACITY OF THE BENGALLEES

By P. DE, B.Sc., M.B. (Cal.), F.R.C.P. (Edin.)
Professor of Physiology, Medical College, Calcutta
and

B. N. DE, M.B. (Cal.)
Demonstrator of Physiology, Medical College, Calcutta

THE vital capacity of individuals has, in recent years, been attracting considerable attention of medical practitioners regarding the diagnosis and prognosis in various diseases of the heart and lungs. Paramount importance has also been laid on selecting candidates for the air service where a minimum standard has been fixed for admission of cadets. In diseases of the lungs, specially in pulmonary tuberculosis, the vital capacity is definitely lowered and the reaction of patient to treatment can be judged by the increase or decrease of the vital capacity.

As early as 1846, Hutchinson (1846) observed that the vital capacity in phthisis was definitely lowered. A diminution of 16 per cent below normal was looked upon as suspicious and in late cases a diminution of 2,000 c.cm. might be found. Arnold (1855) believed, that the vital capacity was not only important in diagnosis but also on the severity of infection and on the results of treatment.

Dreyer and Burrell (1922) specially investigated the importance of vital capacity in diagnosis and prognosis of patients suffering from diseases of the heart and lungs. The vital capacity was diminished in those diseases in which the airways became filled with secretions and also in conditions in which the lungs were compressed. Thus, diminution of the vital capacity was found in pneumonia, bronchial catarrh, emphysema, empyema, asthma, hypertrophy of liver and spleen.

Peabody and Wentworth (1917) observed that the vital capacity in heart diseases was diminished and stated that determination of vital capacity offered a clinical test as to the functional efficiency of the heart, since compensated

(Continued from previous column)

6. Early removal of the maxilla for malignancy gives brilliant results. So early diagnosis is very important.

7. Any swelling of the upper jaw with pain or uneasiness, which grows worse on lying down and in which the alveolar process on the affected side looks inflamed and swollen, with looseness of the teeth, must be viewed with suspicion and a thorough investigation must be made in such cases to exclude malignancy.

8. Even in advanced cases of malignant tumours of the maxilla, where the maxilla was excised, and the patient died of secondary growths, death was less painful than it would have been had the bone not been completely removed.

cases which did not suffer from dyspnœa had a normal vital capacity according to their method of calculation.

From a consideration of these important observations we took up the question of finding an average standard of vital capacity for the people of Bengal living under the same environmental conditions, food, general habits, etc.

Thackrah (1831) examined the vital capacity by using a large graduated glass jar which was filled with water and inverted in more water. The individual blew through a tube the other end of which was introduced under the jar. His observation showed 6 to 10 pints as the vital capacity in man and 3½ pints in woman.

John Hutchinson (1846) made an extensive study of vital capacity on over 2,000 persons and observed that with increasing height the vital capacity increased in a simple arithmetical progression, and that for an increase of every inch of height from 5 to 6 feet an additional amount of eight cubic inches of air at 60°F. is given out by a forced expiration. He also observed the influence of weight on vital capacity. He did not find the existence of direct relationship between vital capacity and circumference of chest though the degree of mobility of the ribs had definite influence on vital capacity. He stated that the vital capacity was influenced by the bodily position in which the observation was taken, chiefly because of altered mobility of the ribs which was greater while standing than sitting, and while sitting than lying. He also observed the influence of age on vital capacity which increased up to 35 and then decreased to 65, and of sex, being greater in the male than the female. The variation of the vital capacity in individuals in different occupations was observed by the same worker.

Arnold (1855) concluded that vital capacity increased with the standing-height and that sitting-height was not of greater value. He considered chest measurement of value specially if 5 to 6 cm. be deducted for fat subjects and 5 cm. added for thinner ones. He considered the weight only so far as it was influenced by height.

Peabody and Wentworth (1917) in America demonstrated a relationship between vital capacity and surface area. They graded healthy individuals according to sex and height:—

	Height	Vital capacity
Males	{ 6 ft. and over	5,100 c.cm.
	{ Over 5 ft. 8½ in. to 6 ft.	4,800 "
	{ 5 ft. 3 in. to 5 ft. 8½ in.	4,000 "
Females	{ 5 ft. 6 in. and over	3,257 "
	{ Over 5 ft. 4 in. to 5 ft. 6 in.	3,050 "
	{ 5 ft. 4 in. and less	2,825 "

He observed that in the case of males 2,660 c.cm. could be taken as the average vital capacity per square metre of body surface.

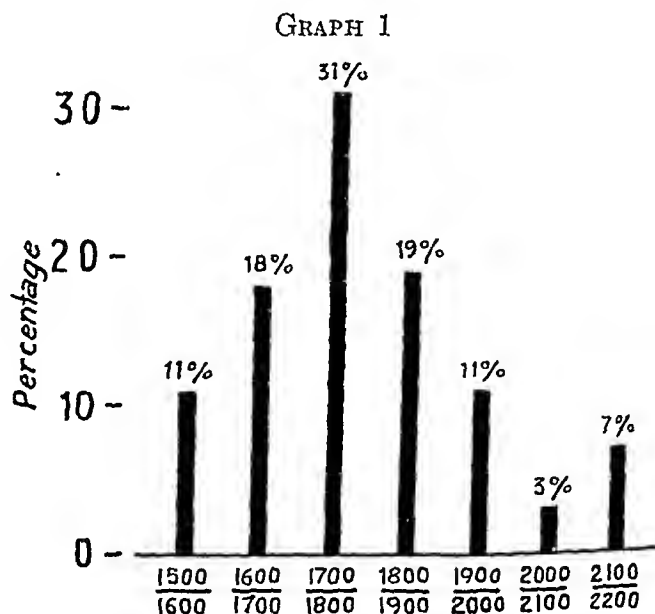
Dreyer (1919) after extensive work on vital capacity laid down formulæ showing the relationship between vital capacity, body weight, stem length and chest circumference.

In this paper we have recorded the age, weight, standing height and vital capacity of 100 students of Calcutta Medical College and have discussed their vital capacities in relation to surface area. The subjects came from different parts of Bengal with different modes of life and activities. The vital capacities have been recorded by means of Verdin's spirometer. The subject sat on a high stool with his back straight and was carefully instructed how to breathe into the spirometer. The recording dial was covered from his view to eliminate psychological effects. Five records were taken and the maximum noted. The vital capacity thus found was reduced to 30°C. and 760 mm. of mercury pressure, the temperature and barometric pressure being observed during the experiments. The surface area of the body was calculated from Du Bois' formula.

$$S = W^{0.425} \times H^{0.725} \times 0.007184$$

The result of our observations is given in table I.

The average vital capacity per square metre of body surface as calculated from table I is 1,790 c.cm. Whereas in America Peabody and Wentworth found it to be 2,660 per square metre of body surface, our figures vary from 1,519 to 2,198 as shown in graph 1.

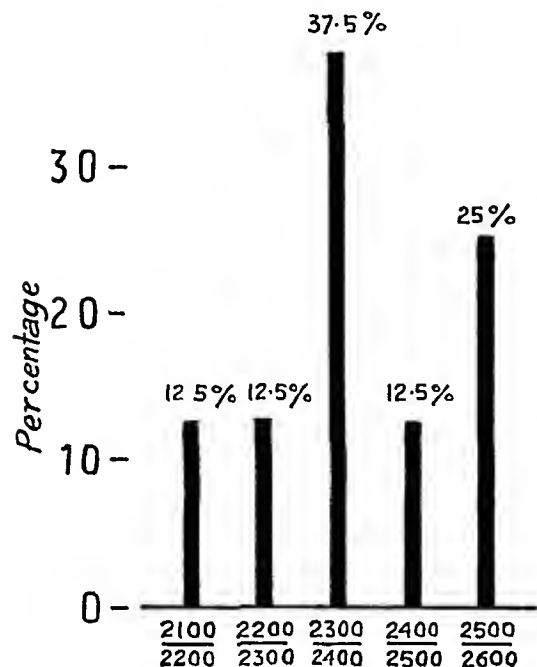


It will be seen from this graph that the vital capacity per square metre of body surface is between 1,700 to 1,800 c.cm. in 31 per cent of our cases. In 68 per cent the vital capacity falls between 1,600 to 1,900 c.cm.

During our observation we found several cases with vital capacity below 1,500 c.cm. per square metre of body surface. On investigation those cases revealed either some past history of diseases of heart or lungs or showed definite

lesions still present (table II). As regards the cases with vital capacity above 2,000 we found

GRAPH 2



after investigation that those cases led very active outdoor lives. For example, in table I

case 2 with a vital capacity of 2,198 c.cm. per square metre of body surface was born and brought up in Shillong which is over 5,000 feet above sea level and he is a good athlete. Case 13 with a vital capacity of 2,157 c.cm. per square metre body surface is a good athlete and plays football, hockey and cricket regularly. Cases 19, 21, 22, 45, 49, 78, 80 and 94 give similar histories.

Dreyer (1919) in England investigated a series of 16 cases taking weight, height, stem length and chest circumference as his data, but he did not take surface area into consideration. In order to compare our figures with his, we took his data of height and weight and calculated the surface areas and so worked out the vital capacity per square metre of body surface, as shown in table III. In his cases the maximum is 2,589 c.cm. and minimum is 2,130 c.cm. with an average of 2,383 c.cm. On grouping these cases, as shown in graph 2, we find that the maximum number, about 37½ per cent, falls between 2,300 to 2,400 c.cm. per square metre of body surface.

We thus have three sets of data, namely, those relating to normal and diseased Bengalee and English persons. Table IV sets out the arithmetical means, standard deviations and the probable errors of the means for these three groups.

TABLE I
Results of examination of 100 healthy Bengalee students

Serial number	AGE		Weight in gm.	Height in cm.	Surface area in sq. metre	Vital capacity in c.cm. at 30°C. and 760 mm. Hg.	Vital capacity in c.cm. per sq. metre of body surface
	Years	Months					
1	18	10½	40,607	164.46	1.399	2,341	1,673
2	19	2	41,828	161.90	1.400	3,076	2,198
3	19	0	40,834	153.00	1.333	2,445	1,834
4	17	7	47,854	158.10	1.459	2,835	1,944
5	16	10	43,545	168.28	1.476	2,601	1,773
6	16	8	46,380	167.60	1.500	2,826	1,884
7	18	5	54,998	171.30	1.640	2,884	1,759
8	17	11	63,163	165.70	1.700	2,952	1,737
9	18	7	48,875	165.10	1.520	2,578	1,696
10	17	10	47,854	161.30	1.473	2,601	1,766
11	17	7	42,204	157.50	1.375	2,445	1,780
12	20	4	48,081	163.60	1.500	2,748	1,832
13	19	5	51,937	172.00	1.608	3,468	2,157
14	18	6	53,298	168.00	1.590	2,554	1,606
15	17	5	53,751	160.00	1.549	2,719	1,755
16	17	3	59,875	166.10	1.664	2,534	1,523
17	17	4	57,607	165.70	1.635	2,845	1,740
18	18	4	50,803	171.40	1.588	2,641	1,663
19	17	3	50,576	170.00	1.576	3,340	2,118
20	17	4	60,555	165.70	1.669	2,602	1,559
21	17	4	46,947	161.28	1.469	3,098	2,109
22	17	6	43,092	150.00	1.345	2,709	2,014
23	18	0	47,410	168.37	1.525	2,738	1,796
24	17	5	45,473	162.60	1.459	2,685	1,838
25	17	4	59,080	152.40	1.549	2,587	1,670
26	18	3	48,648	165.50	1.526	2,880	1,884
27	18	3	63,504	172.90	1.760	3,047	1,735
28	17	3	49,215	160.00	1.492	2,362	1,578
29	17	2	70,290	165.00	1.774	3,186	1,796

TABLE I—*concl'd.*

Serial number	AGE		Weight in gm.	Height in cm.	Surface area in sq. metre	Vital capacity in c.cm. at 30°C. and 760 mm. Hg.	Vital capacity in c.cm. per sq. metre of body surface
	Years	Months					
30	19	0	49,442	165.40	1.528	2,598	1,700
31	18	0	59,875	179.00	1.757	3,264	1,858
32	17	5	53,751	169.40	1.612	2,647	1,643
33	18	4	54,432	170.90	1.633	2,892	1,771
34	18	4	48,082	167.00	1.522	2,402	1,579
35	17	8	49,783	168.30	1.553	2,490	1,603
36	19	5	46,491	165.30	1.491	2,706	1,814
37	17	5	77,805	184.00	2.004	3,181	1,588
38	18	0	44,906	163.90	1.460	2,843	1,947
39	17	0	45,133	163.20	1.458	2,550	1,749
40	16	11	64,298	179.70	1.817	2,892	1,592
41	17	9	52,390	164.50	1.575	2,600	1,651
42	16	6	67,586	170.75	1.790	3,127	1,747
43	17	3	59,648	165.60	1.658	2,874	1,734
44	18	4	66,789	170.60	1.777	2,874	1,617
45	18	0	49,669	164.50	1.525	3,312	2,172
46	18	3	51,937	165.50	1.564	2,971	1,900
47	21	7	53,298	175.80	1.650	2,898	1,758
48	18	9	43,118	170.18	1.480	2,957	1,997
49	20	8	50,349	168.90	1.562	3,340	2,144
50	20	6	47,854	171.00	1.545	3,066	1,985
51	17	5	50,914	159.40	1.509	2,849	1,888
52	17	8	58,714	160.60	1.628	2,947	1,809
53	17	11	58,173	163.80	1.627	3,124	1,921
54	19	6	50,112	168.90	1.562	2,751	1,761
55	21	2	52,956	168.90	1.592	2,767	1,738
56	17	6	71,442	175.70	1.869	2,992	1,608
57	18	7	63,957	167.60	1.723	3,002	1,742
58	19	5	49,102	163.00	1.509	2,604	1,726
59	17	4	45,813	169.40	1.506	2,287	1,519
60	21	8	42,752	166.60	1.444	2,727	1,888
61	18	3	56,246	171.20	1.653	2,727	1,650
62	19	3	51,030	158.00	1.500	2,949	1,965
63	18	5	52,500	175.80	1.643	2,872	1,748
64	18	5	44,906	163.20	1.450	2,745	1,893
65	19	5	48,762	168.30	1.540	2,727	1,771
66	17	6	58,173	168.30	1.659	2,856	1,722
67	18	9	62,370	175.90	1.767	3,334	1,889
68	17	8	58,741	159.40	1.603	2,818	1,758
69	17	3	48,989	160.60	1.493	2,527	1,692
70	17	5	51,030	169.50	1.578	2,818	1,786
71	20	0	54,885	171.30	1.639	2,916	1,779
72	18	9	48,884	170.20	1.553	3,004	1,935
73	20	0	50,350	163.00	1.513	2,944	1,945
74	19	6	42,638	155.50	1.387	2,216	1,598
75	18	5	50,576	170.7	1.580	2,600	1,645
76	19	10	50,803	160.6	1.512	2,517	1,664
77	19	0	51,500	156.00	1.492	2,547	1,707
78	18	4	50,814	163.20	1.533	3,137	2,046
79	18	4	47,628	165.10	1.504	2,553	1,697
80	19	6	63,277	168.00	1.722	3,624	2,105
81	18	10	50,803	164.4	1.530	2,559	1,673
82	21	1	63,050	165.30	1.695	2,617	1,543
83	20	9	52,344	168.50	1.594	2,425	1,520
84	18	11	46,040	165.50	1.485	2,714	1,827
85	18	9	58,741	163.00	1.630	2,907	1,783
86	19	5	51,937	158.00	1.511	2,665	1,764
87	17	5	39,770	160.03	1.362	2,471	1,814
88	21	0	75,018	170.18	1.865	3,584	1,923
89	21	0	60,102	162.56	1.641	3,022	1,841
90	20	6	66,789	168.4	1.763	3,313	1,879
91	20	4	76,104	172.08	1.902	3,013	1,584
92	21	0	64,537	170.18	1.748	3,062	1,752
93	21	2	61,236	163.78	1.664	2,797	1,681
94	22	1	50,803	160.02	1.512	3,096	2,047
95	21	0	66,225	163.30	1.718	3,106	1,808
96	21	5	47,854	164.00	1.495	2,716	1,817
97	23	0	60,102	164.64	1.656	3,114	1,880
98	21	0	63,050	167.64	1.713	2,813	1,643
99	21	0	48,762	175.26	1.586	2,712	1,710
100	21	0	63,504	167.64	1.713	3,344	1,952

TABLE II

Cases which revealed past or present diseases of heart or lungs

Serial number	AGE		Weight in gm.	Height in cm.	Surface area in sq. metre	Vital capacity in c.cm. at 30°C. and 760 mm.	Vital capacity in c.cm. per sq. metre of body surface	REMARKS
	Years	Months						
1	19	9	73,697	166.37	1.819	2,274	1,250	Pneumonia 6 months back.
2	20	9	45,360	158.10	1.428	1,948	1,364	Pneumonia 10 months back.
3	22	5	53,235	156.20	1.514	2,016	1,446	Bronchitis.
4	17	6	41,172	162.00	1.391	2,171	1,560	Pulmonary tuberculosis.
5	18	7	61,300	171.3	1.754	2,335	1,331	Aortic regurgitation.

TABLE III

Dreyer's figures from which surface area has been calculated for purpose of comparison

Number	AGE		Weight in gm.	Height in cm.	Surface area in sq. metre	Vital capacity in c.cm.	Vital capacity in c.cm. per sq. metre of body surface
	Years	Months					
1	51	10	88,800	186.0	2.148	5,130	2,389
2	35	1	63,500	172.0	1.751	4,440	2,536
3	31	7	74,600	184.5	1.972	4,660	2,363
4	27	11	63,500	172.0	1.751	4,200	2,399
5	43	3	69,100	164.2	1.756	4,400	2,506
6	31	3	63,500	171.0	1.744	4,200	2,408
7	35	2	77,400	172.5	1.910	4,800	2,507
8	25	0	81,000	184.0	2.040	4,890	2,397
9	25	0	63,500	171.0	1.744	4,160	2,385
10	28	9	56,300	160.5	1.583	3,830	2,418
11	22	0	66,900	179.6	1.847	4,400	2,383
12	24	0	81,100	178.0	1.992	5,140	2,589
13	18	1	58,600	168.8	1.669	3,800	2,277
14	14	6	41,200	150.0	1.320	3,030	2,295
15	13	9	38,900	156.0	1.326	2,840	2,142
16	12	10	29,800	140.0	1.094	2,330	2,130
							Average 2,383 c.cm.

TABLE IV
Comparative table

Sample	Mean vital capacity per square metre body surface	Standard deviation	Probable error of the mean vital capacity
Normal Bengalee	1,790.02	156.38	10.55
Diseased Bengalee	1,390.20	118.10	35.62
English persons	2,382.75	126.53	21.34

Statistical test of significance shows that the difference between the mean vital capacities of normal and diseased Bengalees cannot be regarded as a chance occurrence. The difference between the normal people of Bengal and of England is also significant statistically.

From a comparison of the figures for vital capacity of people in America and the British

Isles with those of ours, it will be observed that in America and England the vital capacity per square metre of body surface is higher than that found in Bengal.

We wish to acknowledge with thanks the suggestions and help that we have received from Dr. L. E. Napier, Officiating Professor of Tropical Medicine, Calcutta School of Tropical Medicine, and Dr. R. B. Lal, Officiating Director, All-India Institute of Hygiene and Public Health, in connection with this paper.

Summary

1. Observation of normal healthy cases showed that the vital capacity of average Bengalee youths of 17 to 23 years of age is 1,790 c.cm.

2. Low vital capacity, observed in our cases showed present or past history of some disease of heart or lungs.

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PRELIMINARY TUBERCULOSIS SURVEY OF RURAL AREAS IN THE PUNJAB

By ILAHI BAKHSH, M.D. (Lond.), M.R.C.P. (Lond.)
MAJOR, I.M.S.

Professor of Pharmacology and Therapeutics, K. E. Medical College and Physician to Out-patients, Mayo Hospital, Lahore

TUBERCULOSIS is said to be on the increase in India. The remarkable progress motor traffic has made during the last two decades has greatly facilitated intermingling of the rural and urban populations. There is no doubt that tuberculosis is rife in the congested areas and slums of Indian towns but very little information is available about its incidence in the villages.

With perhaps one exception no reliable survey of tuberculosis has so far been conducted in the Punjab. It was on the suggestion of Colonel G. G. Jolly that I took up this work during Christmas vacation.

The number of people examined is admittedly small but it is hoped that the experience gained and the information given below may be of some help to those who wish to undertake this type of work in the present campaign against the scourge of tuberculosis.

The Tuberculosis Survey Committee, Indian Research Fund Association, recommends four types of survey: Type I survey is a preliminary survey dealing with rate and distribution of infection and is ascertained by testing every individual with tuberculin. Type II, III and IV surveys are more detailed and are concerned with extent and nature of active infection, disease and mortality rate, etc. The present paper deals with type I survey only.

The villages selected were Mirpur and Muzaffarpur in Nakodar Tahsil, Jullundur District, for the following reasons:—

(1) Both the villages are situated at a considerable distance from the nearest town. Muzaffarpur is nearly $2\frac{1}{2}$ miles from Nakodar (population about 10,000) while Mirpur is at a distance of $1\frac{1}{2}$ mile. There is no motor traffic between Nakodar and these villages. The market place in Nakodar is situated about half a mile outside the town but the villagers rarely

(Continued from previous page)

3. Cases with vital capacity above 2,000 c.cm. per square metre body surface led active outdoor lives.

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go there to sell their merchandise because the inhabitants are only small landholders and their produce is only just enough to meet their own requirements.

The inhabitants are almost entirely Muslims excepting a few sweepers and they belong to the agriculturist class called Arains. There is practically no purdah in these villages, the women work with the men in the fields. The villagers spend most of the day in the fields. At night time in summer they sleep on top of their roofs or near their cattle in the open spaces adjacent to the village. In winter they sleep in mud houses which have very few windows and ventilators. The cattle sheds are separate from the sleeping rooms and nobody was found to sleep in the same room occupied by the cattle. Muzaffarpur is less congested than Mirpur where the people are somewhat poorer and live in much smaller houses.

From the above it is clear that both the villages are typically rural and isolated from the influence of neighbouring towns. Unlike other villages in Jullundur District there are only one or two men in each village who have been abroad. In some of the villages in this district 20 to 30 per cent of the men have visited America, Europe, Africa, China and Japan.

Before the enquiry was started co-operation of the administrative authorities was secured by personal interviews and the inhabitants were lectured on the broad principles of this work. Fortunately the local public were indebted to me for having treated their sick on many occasions during college vacation. Objection to being 'pricked' was therefore insignificant and this was overcome by tactful and gentle persuasion.

Through the generosity of Messrs. Merck & Co., I was supplied with large quantities of their special preparations including cod-liver oil, vitamin-B, -C and -D preparations and other expensive drugs far beyond the reach of these poor villagers. In winning the confidence of these half-educated and backward people the importance of rendering specialized medical aid and distribution of medicines right in their own homes cannot be over-emphasized.

The staff consisted of three doctors including myself, a lady health visitor, and two peons. The lady health visitor unfortunately was not available for the whole period. The co-operation of a lady doctor would have been of much more use. Most of the clerical work was done by two *patwaris* and educated volunteers from both the villages.

The *patwaris* were told to prepare the lists of all the inhabitants according to families and these were entered on printed forms giving name, race, age and family with special columns for height, weight, physical examination and Mantoux test. Special attention was paid to the clinical examination and any abnormality found was noted in a special column. The Mantoux test was done according to the

directions given in the pamphlet issued by the Tuberculosis Survey Committee, Indian Research Fund Association, particular care being taken to maintain uniformity of technique. On each day 10 families were told to stay in their houses in the morning and the same number in the afternoon. In this way the inhabitants were put to least inconvenience and their work did not suffer much.

In taking histories the facts were verified in the presence of the village headman who usually knows a good deal about every one. Tuberculin injections were then performed with 1/1,000 dilution in every member of the family except those suspected of having any tuberculous lesion, suspected contacts or very young infants who were injected with 1 in 10,000 dilution.

Results were read after 48 hours and if negative stronger dilutions (1 in 100 in the case of apparently healthy adults and 1 in 1,000 in others) were injected on the 4th day. Reading of results was very tedious as it was difficult to catch inoculated men, who, thinking that our work was over, had left for their fields and sometimes had to be followed there. In spite of all our efforts, 10 per cent of the population escaped investigation.

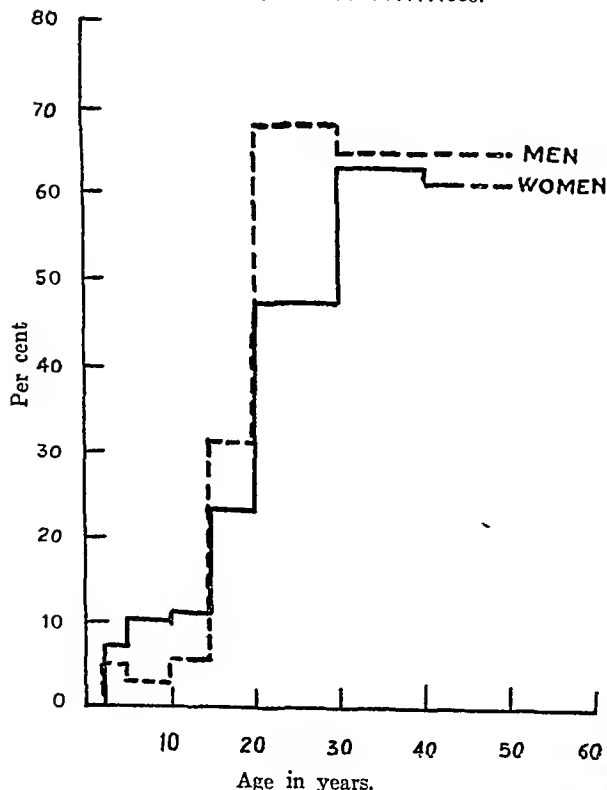
The following graphs illustrate the incidence of infection among the villagers.

MANTOUX TEST

CHART 1

Village.....Mirpur.

Total cases examined.....330.

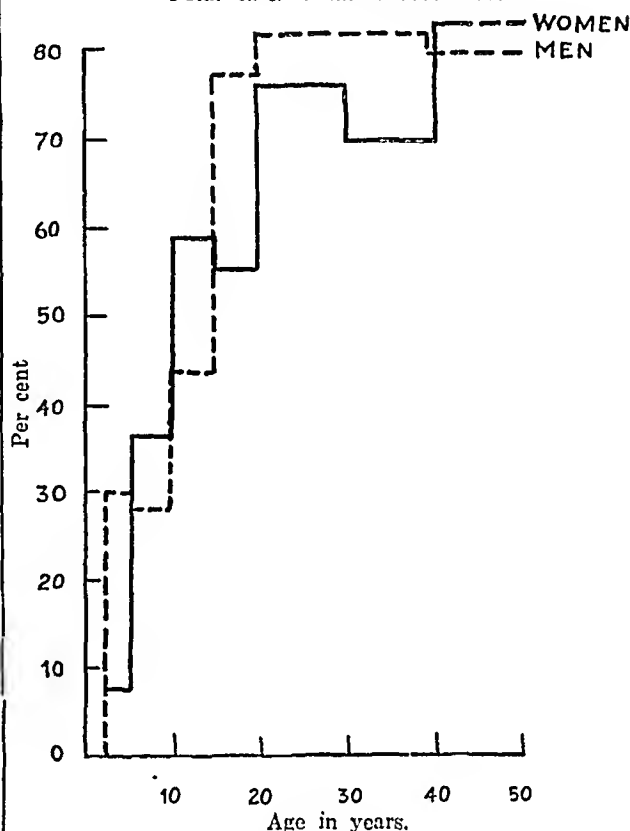


MANTOUX TEST

CHART 2

Village.....Muzaffarpur.

Total cases examined.....233.



None of the children under 2 years reacted to tuberculin and the curve rose steadily with age until it reached 58 per cent between 20 and 30 years. Muzaffarpur on the other hand showed a higher incidence. The curve is steeper, the percentage of positives being 73.1 between 20 and 30 years and 76.9 above 30 years. The infection according to sex does not show any marked difference in both the villages.

The intensity of the tuberculin test is given in the following table :—

MUZAFFARPUR

Intensity of reactions.	Negative	+	++	+++	++++
Males ..	49	41	22	4	2
Females ..	48	29	16	19	3
TOTAL 233	97	70	38	23	5

MIRPUR

Intensity of reactions.	Negative	+	++	+++	++++
Males ..	115	29	24	8	0
Females ..	100	17	29	8	0
TOTAL 330	215	46	53	16	0

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SCARABIASIS OR THE PRESENCE OF BEETLES IN THE INTESTINE

By C. STRICKLAND, M.A., M.D.
Professor of Medical Entomology
and

D. N. ROY, M.D., D.T.M.
Assistant Professor of Medical Entomology,
School of Tropical Medicine, Calcutta

THE occurrence of dung-beetles in the stools of persons is a condition that has been called

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It will be noticed that it is definitely less in Mirpur than in Muzaffarpur. Of the 5 persons giving ++++ reactions, only two gave history of contact, while one, a boy of 21, looked very suspicious but physical signs were negative. There were 23 persons giving +++ reactions in Muzaffarpur and out of these only 8 had a history of contact. None of these showed any physical signs of active or quiescent disease. In Mirpur there were only 16 persons with +++ reactions and none of them had a definite history of contact. None of these showed any physical signs of tuberculosis.

Without further survey it is not possible to give any reasons for the higher incidence of infection in Muzaffarpur where the inhabitants are better socially and there is very little overcrowding. As far as reliable history goes there have been 11 deaths from tuberculosis in this village within 10 years. Out of these 9 belonged to one family of weavers and two belonged to two different agriculturist families. Of the latter two, one was a case of Pott's disease in a young man of 20, and the other was a case of 'galloping' phthisis in a married woman aged 24, both seen and diagnosed by me on previous occasions.

The present history of these families is interesting. There are 8 surviving members of the weaver family and out of these 6, i.e. 75 per cent, are tuberculin-positive. All the members are weak and pale and two young men looked suspicious although physical examinations were negative. One girl aged 10 has phlyctenular conjunctivitis and gave ++++ reaction. The family of the girl who died from acute phthisis consists of 15 members. Out of these 14 were exposed to infection but there were only 6, i.e., 43 per cent, positive. The lower incidence of infection in this family may be due to much better social standard and also to the fact that this family lives in much bigger houses with spacious compounds and both men and women spend most of their days in the open fields.

In conclusion I must thank Dr. Munshi Singh, medical officer in charge Shanker dispensary, and Dr. Ram Rakha, medical officer in charge of the tuberculosis dispensary, Jullundur City, and the civil authorities for rendering me valuable assistance in this work. My thanks are also due to Dr. A. C. Ukil for help and advice in preparing this paper.

searabiasis or 'beetle-disease'. Cases in Ceylon and India* have been reported from time to time by a number of observers, Dey (1919, 1920), Sen (1924), Chakravarty (1919), Senior-White (1920), Senior-White and Sen (1921) and Iyengar (1928).

The belief that in such cases the beetles were passed with the faeces is founded on the report of the medical officers concerned with the clinical aspects of each case, but there is one record by Chakravarti of two live beetles having been passed after the administration of a salt-water enema, and Senior-White has stated that a compounder had told him of two beetles being found in the intestine at autopsy, no note unfortunately having been made as to the part of the intestine in which they were located. The reports in general state that the insects are passed at intervals which may extend over some months. These and other circumstances have led one to conclude that adult beetles live in the intestine of the patients.

Geographical distribution

The condition appears to occur in certain parts of Bengal, Assam, Burma, and Bihar (Ranchi), in South India, and Ceylon. The following is a summary of their species and distribution as recorded by previous observers:—

<i>Onthophagus</i>	Senior-White (1920)	Metale, Ceylon.
<i>unifasciatus</i> *	Iyengar (1928)	Ranchi, Bihar.
<i>Onthophagus</i>	Senior-White and	Bengal.
<i>bifasciatus</i> .	Sen (1921).	
	Iyengar (1928)	Bengal and Burma.
<i>Caccobius</i>	} Iyengar (1924 and 1928).	Faridpur, Bengal.
<i>mutans</i> .		
<i>Onthophagus</i>		
<i>bifasciatus</i> .		
<i>Onthophagus</i>	Sen (1924)	Faridpur, Bengal.
<i>bifasciatus</i> .		Akyab, Burma.

* Senior-White identified as *O. bifasciatus*, whereas Arrow considered the species *O. unifasciatus*.

We now add further notes regarding beetles that have been forwarded to us either in a dry state or in spirit by the medical officers concerned.

The infestation of the alimentary canal of children is perhaps more common than such records would lead one to believe; they apparently connote a rural disease, of which a relatively small proportion of cases have come to the notice of doctors.

One noticeable feature about the condition is the age-incidence: it has not been reported from sucklings and only once from an adult;

* de Meillon (1937) has reported it from South Africa.

only those who have cut their teeth and are able to take solid food have been affected.

teric symptoms. Progressive emaciation has been a marked sign and sometimes there are

Donor	Source of specimen	Age of patient	Number of specimens	Identification	Determined by
Dr. Murphy ..	Chandpur Bagan, South Sylhet, Assam.	No information.	7	<i>Onthophagus bifasciatus</i> .. 6	Arrow.
Dr. Meek ..	Cachar, Assam	Do.	1	<i>Onthophagus orientalis</i> .. 1	Beeson and Arrow.
Dr. Chatterjee ..	Faridpur, Bengal	3 years	6	<i>Caccobius (Aspectus) indicus</i>	
				<i>Caccobius (Onthophagus) nitidiceps</i> .. 1	
				<i>Onthophagus bifasciatus</i> .. 2	
				<i>Onthophagus orientalis</i> .. 1	
				<i>Onthophagus centricornis</i> .. 2	
Dr. G. Panja ..	Faridpur		2	<i>Onthophagus unifasciatus</i> .. 2	Do.
Dr. Bhaduri ..	Sylhet, Assam	1½ year	9	<i>Caccobius unicornis</i> .. 9	Arrow.
Dr. Dutta ..	Chittagong	3 years	1	<i>Onthophagus orientalis</i>	Do.
Dr. Pillai ..	Travancore		6	<i>Onthophagus cervus</i> .. 1	Do.
				A new species of <i>Onthophagus</i> 2	Do.
				<i>Onthophagus unifasciatus</i> 3	Do.
Dr. Roy Chowdhury.	Sylhet	1½ year	2	<i>Onthophagus bifasciatus</i> .. 1	Arrow.
				<i>Onthophagus cervus</i> .. 1	Do.
Dr. Coltman ..	P. G. Hospital, Calcutta.	19 years*	1	<i>Saprinus</i> sp.	Do.
Dr. Dutt ..	Barisal	No information.	2	<i>Onthophagus bifasciatus</i>	Do.
Dr. Ghose ..	Cossipore, near Calcutta.	Do.	5	<i>Onthophagus bifasciatus</i>	Do.
per Dr. Maplestone	Not known	3 years	7	<i>Caccobius unicornis</i>	Do.
Dr. Ghosal ..	Not known; from somewhere in East Bengal.	No information.	2	<i>Caccobius unicornis</i> .. 1	Do. { Possibly from the same child.
				<i>Onthophagus bifasciatus</i> .. 1	
Do. ..	Do.	Do.	2	<i>Onthophagus bifasciatus</i>	Do.
Dr. Ojha ..	Not known	Do.	1	<i>Onthophagus bifasciatus</i>	Do.
per Dr. Maplestone	Do.	Do.	2	<i>Onthophagus bifasciatus</i>	Do.
Dr. Sen Gupta ..	Hope Tea Estate, North Bengal.	Do.	1	<i>Onthophagus bifasciatus</i>	Do.

* Associated with intestinal myiasis, *Sarcophaga ceylonensis* bred out.

Dr. Coltman's case was the only one which was much above the ordinary age, and it otherwise proved to be interesting. The patient was a wireless operator on a ship and had been admitted to hospital for bacillary dysentery. He there passed a large number of maggots which were brought to us in water and we were able to breed out only 2, which proved to be *Sarcophaga ceylonensis*; subsequently he passed others and though none from this batch could be reared in the laboratory, the characters of their posterior spiracles pointed to their also being larvæ of *Sarcophaga*. It was in the latter stool that a coprid of the genus *Saprinus* was found.

All previous observers have reported the occurrence of only one species of Coprid from the same patient, whereas it will now be seen that invasion by more than one species may take place in the same patient. Out of 6 beetles forwarded by Dr. Pillai from Travancore three species of *Coprinae* from one stool were encountered, and among Dr. Chatterjee's collections from Faridpur there were as many as 4 species in a single stool.

The passing of beetles in the stool naturally causes a great deal of alarm in a family, especially when it is attendant upon a long train of symptoms. The child has perhaps been in indifferent health, has lost his appetite and frequently had diarrhoea and occasionally dysen-

teric symptoms. He has usually been treated for his intestinal symptoms and the passing of an insect with the stool naturally causes great alarm. The stool is usually semi-solid, never hard, and after it has been voided, the attention of the mother may be attracted to some movement in it, a beetle gradually looms up to the surface, emerges and flies away. As a rule the infestation is by more than one beetle and sometimes large numbers are passed over a period of months, the health of the child improving in the intervals.

Habitat and life history

Very little is known of any of the above-named species, Arrow (1931) giving the following information:—

<i>Onthophagus bifasciatus</i>	A specimen found upon a dead rat by Dr. Gravely.
<i>Onthophagus unifasciatus</i>	Dr. Beeson has found this species on a dead lizard at Bangalore and it has also been seen in heaps of decaying grass-hoppers at Yammiganur: it is the species most commonly associated with scarabiasis.
<i>Onthophagus cervus</i>	One of the most abundant of Indian <i>Coprinae</i> .

The life-history of members of the sub-family *Coprinae* has an important bearing on their method of invasion of the victim and it may be assumed that all species are dung-rollers, their life-history differing only in small details.

As far as is known each egg is laid separately in carefully prepared chambers in a mass of dung with a store of food sufficient for the needs of the young insect during the whole period of immaturity and parasitism and as a rule it is not observed. The total number of eggs laid is as a rule small, in some cases as few as three or four and probably always less than a dozen: they hatch in a few days after their deposition. According to Lefroy the larval life of an Indian *Onthophagus* lasts about 21 days. The pupal stage is assumed inside the chamber and after about 4 weeks' interval the adult stage is attained, therefore the life-cycle from egg to adult covers a period of from 6 to 7 weeks.

Mechanism of infestation

How do the beetles obtain access into the human intestine?

Two hypotheses hold the field, that they gain entrance with the food, and that they enter by the anus.

It is quite possible that the invasion takes place through the mouth. Beetles during their early stages may be ingested accidentally with the food, when for instance young children eat food picked up from mud floors, as they often do. The mud floors of houses in East Bengal, where such cases commonly occur, are smeared every morning with a mixture of cowdung in water, but whether these species of beetle oviposit in cowdung is not known.

If the invasion takes place by the mouth, the eggs or later stage insects must be not only able to resist the action of the intestinal juices but also grow and develop to the adult stage in the alimentary canal. It is of course possible for an insect that habitually lives in aerobic surroundings to complete its life-cycle in an anaerobic medium, *Apiochæta ferruginea* being a good example.

Coleoptera are holometabolous insects and if the invasion takes place through the mouth, it should be possible to confirm it by making a very careful search for the early stages and finding the larval and pupal skins in the stool. We have had no opportunity so far of having a patient under our care in the hospital, and hence such an investigation has not been possible.

That the invasion takes place through the anus was first suggested by Senior-White and Sen (1921), and Fletcher (1924) thought the adult beetles, guided by a keen sense of smell in search for human ordure, effect an entrance *per anum* in children of the age of 2 to 5. The identification of the sex of the beetles that had been generally found in the stools is in favour of this suggestion, as all, except one, turned out to be of one-sex, which would not have been likely if the infestation had been derived *per os*.

However although the sex-ratio in all of our own collections was not ascertained, in one instance when 7 beetles were forwarded to us for examination, 6 males and 1 female, and in another, out of 9 specimens, 6 males and 3 females were recorded.

Iyengar also believes that the beetles effect an entry *per anum* while the child is asleep and not at the time of defæcation, as previously suggested by Senior-White and Sen (1921). In support of this hypothesis he has cited the instance of *Macropocopris*, which usually lives on the droppings of the wallaby in Australia. 'These beetles cling to the fur of the wallaby and as soon as the wallaby evacuates, they jump on to the droppings and live on them. This is their normal procedure but often enough it has been found that they effect an entry into the cloaca of the wallaby and live in its lower intestines'.

Children in rural India between the ages of 2 to 5 years usually visit a screened place adjacent to their dwelling and sit on the ground. The stool is seldom cleaned up at once: it may, however, be washed away or left to be eaten by jackals, dogs and other scavengers. When it is thus left for 3 or 4 days, many insects, especially beetles, take shelter under it and at the time of a child defæcating the beetles might enter the rectum through the anus.

The presence of more than one species in the excreta of the same patient perhaps connotes invasion by the anus.

On the other hand the freedom of helpless sucklings is against the hypothesis, as they particularly lie about on the floors and are often in such an unclean condition that they should be most attractive to the beetles.

Whether the infestation be *per os* or *per anum* it is difficult to explain how the patients continue to pass the insects for months on end even after the subjects have been removed to better sanitary surroundings.

Our thanks are due to Dr. G. Arrow of the British Museum and to Mr. Beeson of the Indian Forest Service for the trouble they have taken to identify the specimens forwarded to them.

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A Mirror of Hospital Practice

APPLICATION OF VAUGHAN'S MODE OF DELIVERY, WHERE FORCEPS WERE DEFINITELY INDICATED*.

By MARY KEITH-THOMPSON, M.A., M.B. (Cal.),
F.R.C.S. (Ed.), L.M. (Coombe), D.T.M. & H. (Eng.)
New Delhi

The patient, 37 years of age, was a Brahmin. She had had one abortion and eight children, all are alive except the second, the last was delivered by me, about 4 years ago. I had seen the patient only once, when she was about 8½ months pregnant. The child was in the LOA position, with the head fairly small and easily pushed through the brim.

In August last, the husband informed me that his wife had influenza but that she did not need me to visit her.

About 8 p.m., on the 5th of September, the *dai* who was to assist me in the case, came and reported that the patient had been having slight labour pains, since early in the morning but that I need not go immediately. I suspected uterine inertia, and so left instantly. When I got there about 8-30 p.m., I saw that the patient had a definitely pendulous abdomen and was walking about in her room. She had taken a dose of castor oil at 6 p.m. and the pains were now coming more regularly and more strongly. She was also suffering from bronchitis, after the influenza, she had in August. About 9 p.m. she passed a loose motion followed by another in a short while.

On internal examination I found the os two fingers dilated, the head floating freely above the brim but the exact size of the head could not be gauged, because of the extreme thickness of the abdominal wall. Strong pains were now coming every 5 minutes but there seemed to be no progress at all, and the patient was becoming anxious and restless. At 11 p.m. I did another internal examination and found that the os had now dilated to 2½ fingers only. I doused the vagina with half an ounce of chloral hydrate mixed with two teaspoonfuls of boric acid in two pints of water, as hot as the patient could stand. A binder was next applied.

12 midnight.—The patient was becoming exhausted and begging of me to apply forceps but refused to have any anæsthetic.

12-25 a.m.—The os was fully dilated and the head apparently fixed, remained stationary even with the strong pains and seemed fixed behind the pubic rami.

12-30 a.m.—The membranes ruptured but still there was no progress of the head.

1 a.m.—The head was still in the former position. I was considering putting the patient in the Walcher's position and applying forceps but in this there were two difficulties—

(1) The patient objected to an anæsthetic.

(2) The bed was extremely low and neither bricks nor books were available to raise it.

Accordingly I decided to use Vaughan's method of delivery. After some difficulty the patient agreed and at 1-20 a.m. she was put in the squatting position.

1-25 a.m.—After only one strong pain, a portion of the head was showing, at the perineum. I then quickly put the patient lying on her back as usual, and took control of the perineum.

1-30 a.m.—The large head was delivered. As soon as the head was out, the pains ceased altogether, so the shoulders and the rest of the body had to be extracted manually.

2 a.m.—The pains fortunately started again and the placenta was expelled without any trouble. As usual, the patient was given a dram of liquid extract of ergot in water followed by injections of 1 c.cm. pituitrin extract and 10 c.cm. polyvalent puerperal anti-streptococcal serum and she was advised to take quinine and ergot mixture, from the next morning.

After some trouble in the puerperium the patient made a satisfactory recovery.

Remarks

1. The true conjugate, in Walcher's position it is said, is lengthened by half an inch; it would be interesting to find out exactly by how much it is increased in the squatting position.

2. Once the head has passed through the brim, the patient should be put back into the orthodox position and the perineum controlled, in the usual way, to prevent a rupture.

3. In all borderline cases and in those with slight disproportions, before the application of forceps, the patient may be put into this position.

4. As this seems rather an uncomfortable position at term, even for an Indian patient, I should adopt this mode of delivery, only in a case of difficult and prolonged labour.

DIPHTHERIA IN AN UNUSUAL LOCATION

By K. GHOSE, M.B.
Raniganj, E. I. Ry.

ON 28th October, 1938, I saw a girl, aged eight months. It was said to be the third day of her illness. Her upper lip was markedly swollen and everted, and on its inner surface there was an ulcer extending over almost the whole of its length and breadth. The ulcer was covered by what seemed to be a thick, white slough. At the centre of the lower lip, there was a small white patch, this lip was not swollen. The girl was running a temperature between 100.4°F. and 102°F., from the beginning of her illness. Moist sounds could be heard over both the lungs, especially over the left base. She was given prontisol album from that morning, besides local treatment. Exactly how the ulcer developed could not be learned from the parents; all that could be gathered was that it had begun as a tiny vesicle and assumed these proportions within three days.

By the evening of the next day the swelling of the upper lip appeared slightly less. The white slough had been removed by the patient's mother, leaving a raw surface. The lower lip was slightly swollen. Otherwise, there was no change.

* Abridged by the Editor.

On 30th October it was found that the upper lip was more swollen than on the previous day. The ulcer had extended beyond the angle of the mouth on either side, and the white slough had formed again. The white patch on the lower lip had increased in size and there was a similar patch on the tip of the tongue. The girl appeared fretful and resented being disturbed in any way. It was thought at this stage that the case might be one of diphtheria, and smears were taken from the ulcer that evening. The temperature, that night, shot up to 104.4°F.

The laboratory report, which was received next morning, confirmed the suspicion and accordingly 8,000 units of diphtheria antitoxin were injected intramuscularly. At the time of injection it was noticed that the swelling of the upper lip was less than on the previous day. The girl had a temperature of 102.4°F. in the morning, which rose to 104°F. at night. Protosil was discontinued from this day.

The next morning the swelling of the lips was much less and the temperature was 100°F. Another 8,000 units of the antitoxin was injected. In the evening the temperature rose to 103°F.

On the following day the swelling became still less and the temperature came down to 98°F., for the first time during the illness, in the morning, but rose to 101.4°F. in the evening.

No further injections were given. The ulcer healed gradually in the course of the following few days, and the girl made an uneventful recovery. The catarrh of the lungs persisted throughout. During the whole course of her illness the girl never showed signs of toxæmia and the throat did not show any detectable evidence of infection which, together with the unusual site of localization, is the main point of interest in this case.

I wish to thank Dr. S. K. Roy, bacteriologist, the Mines Board of Health Laboratory, Asansol, for the laboratory report.

AN INTERESTING CASE OF ASCITES*

By S. N. DATTA, L.M.P.

*Assistant Medical Officer, Bordubi Tea Estate,
Doom Dooma, Assam*

G., an Oriya female, aged 30 years, married, was admitted into the Bordubi Hospital on the 2nd November, 1938, with the complaint of fluid escaping through her umbilicus.

Condition on admission.—She was of medium build and height, poorly nourished. Hæmoglobin—55 per cent. There was an enlargement of abdomen due to a certain amount of fluid in it. Spleen—enlarged. Liver—normal. Heart sounds—nothing abnormal. Lungs—normal. Throat—normal. Urine: colour—yellow, specific gravity—1012. Reaction—acid and no abnormal constituents. Albumin present in escaping fluid.

Stools—no helminthic nor protozoal infection.

The umbilicus was hard with a prominent lump. No œdema. No umbilical hernia. Temperature—97.4°F. Pulse—76 per minute. Respiration—16 per minute.

Previous history.—She had one abortion in 1936. In 1938 she gave birth to a premature male child which died after a day. On both these occasions she was anæmic with some amount of œdema of her extremities. Two days prior to her admission, on the 31st October,

1938, afternoon while she was lifting a medium-sized bucket full of water, she noticed some fluid gushing out through her umbilicus, and she collected the fluid in the bucket in which she carried water. The fluid ceased flowing after the bucket was three-fourths full. A slight amount of fluid dribbled all the time while she was in hospital. She took it to be a pregnancy as she had had no periods since she noticed the gradual enlargement of her abdomen, i.e., for about six months.

Her friends remarked that some one had bewitched her and converted her pregnancy to water. She went back to her house and applied some indigenous preparation to her umbilicus to stop the oozing. She was doing her household work without any trouble whatsoever.

On hearing the history of the case from the line compounder, I wanted to bring her into the hospital next morning, but she said, 'I am better now and will go to the office this afternoon to report the name of the wizard to the manager, then afterwards I will come to the hospital'. She came to the hospital on the morning of the third day with some enlargement of the abdomen, and on slight pressure the fluid came out through the umbilicus.

The ascites was obviously not due to cardiac or renal disease, as no signs of such disease were present. Tuberculous peritonitis was also improbable, because there was no pyrexia, emaciation, nor enlarged glands in the abdomen. Malignant disease was not possible, there being no enlargement of liver, no jaundice, no emaciation and no signs suggestive of disease in the intestine or in the pelvis. Cirrhosis of the liver, and anæmia (hæmoglobin was 55 per cent) were the other possibilities.

Treatment.—The patient was treated as a bed case and E. C. (electrolytic chlorine solution) dressings were applied over the umbilicus and firmly bandaged. She was put on a mixture containing ammonium chloride gr. xv and calcium chloride gr. xx, three times daily. She was also given iron, arsenic and cod-liver oil as tonics. There was no obvious improvement with this treatment. She was next given two injections of salyrgan every three days. This led to marked improvement and the abdomen became almost normal. She was also given four injections of N.A.B. A similar course was given after her abortion in 1936. The oil morrhue was prescribed for her poor health and general debility. She was discharged on 18th November, 1938, from the hospital after a fortnight as cured.

Points of interest

(i) The rare occurrence of fluid escaping suddenly through the umbilicus.

(ii) Complete lack of any distress or discomfort throughout the illness.

(iii) Six months' amenorrhœa with gradual enlargement of abdomen simulating pregnancy.

(iv) No presumptive signs of specific disease have been observed except for the history of one abortion and one premature birth at 8 months.

(v) Was the subsidence of the ascites due to the two injections of salyrgan or to subsequent exhibition of N.A.B.?

Acknowledgments.—My grateful thanks are due to my chief Dr. D. M. Bertram, for his valuable advice and kind permission to read this note, and also to Mr. R. A. Crampton, Superintendent of the garden, for his keen interest in this case and all hospital affairs.

*Being a paper read at a meeting of the Assam Frontier Budla Beta Medical Society held on 6th May, 1939, at Doom Dooma Club.

Indian Medical Gazette

JULY

LATHYRISM

It is an everyday experience to encounter victims of lathyrism in the streets of Calcutta. These people usually come from North Bihar or the United Provinces and are beggars by occupation. Most of them have been cultivators or labourers, and the usual account they give of the onset of their disability is that during some years of scarcity they had to live mainly on chick peas and that the disease then began, insidiously in some cases, suddenly in others. The disability gradually increased until they could walk only with the help of sticks, their legs stiff, weak and trembling and their gait spastic and scissors-like. In advanced cases progression is effected by crawling on the balls of the feet and on the hands.

Lathyrism was first recognised in Europe over two hundred and fifty years ago, and it is obvious that even in those early and unscientific times it was ascribed to the ingestion of the seeds of various species of the genus *Lathyrus*, because as early as 1671 the Duke of Württemberg issued an edict forbidding the use of these seeds. Later, it was observed in Italy, France, Algeria and certain eastern countries. It is now rarely seen in Europe and the chief interest in this disease at present centres in India where it is shown to have been prevalent for at least as long as written records of Indian history exist and where it is still one of the most important causes of paralysis and deformity among the poorer sections of the population in certain parts of the country. During the last hundred years it has been frequently reported upon by writers on medical matters of local interest and importance, and a great deal of the most recent research on the still-disputed aetiology of lathyrism has emanated from workers in India.

The disease is regarded as a form of food poisoning by most authorities and, as the name implies, substances in the seeds of the genus *Lathyrus* have usually been considered to be its cause. In India, the species held responsible is *Lathyrus sativus*. Stockman and Dilling both lent support to this theory because they independently isolated from the seeds of this plant alkaloidal substances which when inoculated into animals produced symptoms suggestive of lathyrism. Acton and Chopra also held the opinion that the seeds of *L. sativus* contained a toxic substance, but the toxin they isolated, and which caused lathyrism-like signs in monkeys and ducks, was a water-soluble amine. So that, although these workers are all in agreement as to the seeds being the cause, they are at variance

as to the actual offending substance. Further evidence adduced by still other workers, as a result of animal experiments, are also conflicting, probably because samples of seeds of *L. sativus* are very frequently contaminated by seeds of various unidentified weeds, which most likely play some part in the production of these varying results recorded. Howard, Simonsen and Anderson showed that botanically pure lathyrus seeds could not produce any toxic effect, but a contaminant of the lathyrus seed, *Vicia sativa* (*akta*), contained bases having alkaloidal properties, which produced definite signs of poisoning with involvement of the central nervous system in laboratory animals such as guinea-pigs. McCombie Young was of the opinion that deficiency of vitamins, particularly vitamin A, was a factor in the production of the disease. Stockman later reported that watery extract of lathyrus contained a salt of phytic acid which was toxic to the brain and spinal cord. Stott could not reproduce the symptoms in horses by feeding them on *L. sativus* or *V. sativa*.

The above brief outline shows that there are two main views regarding the causation of the disease, viz, (a) that it is due to food intoxication, either by *Lathyrus sativus* or by *Vicia sativa* and (b) that it may be to some extent a deficiency disease.

In this issue of the journal there is a paper setting forth the details of an outbreak of lathyrism in a Punjab village, this village is in an area where there have never been cases of lathyrism before. The paper brings out several features of interest. The disease affected the Sikh agriculturists mainly, and three males to every two females suffered. The pea *Lathyrus sativus* was definitely not the cause of the disease, as this was not cultivated in the locality, nor did it occur as a contaminant of other cereals. It was finally found to be caused by ingestion of flour made from wheat that contained seeds of *Vicia sativa*. This vetch seems to have occurred as a weed in the wheat fields and was harvested along with the wheat. Inspection of the wheat showed the presence of these seeds and the identification of them as *V. sativa* was definitely established, as plants grown from the seeds were found to be the same specimens as of *V. sativa* plants supplied by a botanist.

The symptoms of the disease became aggravated whenever the people took bread made from the old stock of wheat that was contaminated with vicia seeds; wheat from other sources had no such effect. These findings have lent support to the *V. sativa* (*akta*) contamination theory of Howard, Simonsen and Anderson and has ruled out the possibility of *L. sativus* being the noxious agent. Avitaminosis cannot be dismissed completely as a possibility in view of the poverty of the people, but avitaminosis, if present, must have been there for years while the epidemic of lathyrism followed the harvesting of the wheat crop contaminated with *V. sativa* seeds.

in. Keep the patient in bed or at least flat on his back with knees raised at right angles to the body and head at a lower level than the body. Cover the patient with blankets, give hot water bottles, massage the limbs and apply binders on the limbs from below upwards towards the abdomen, in order to confine the circulation as far as possible to the brain and medulla. Further treatment may be given to the wound and for the respiratory and circulatory failure and collapse.

(a) *The wound*.—Before the actual treatment of the wound is begun, efforts should be made, if possible, to identify the type of snake. The seriousness of the condition and the prognosis depend upon the following points:—*The dose of the venom injected*. It depends upon the size of the reptile and the season of the year. Usually the dose injected is large during the rainy and summer months when the snake is full of vigour and is in search of food. The dose may be expected to be smaller during winter months. (2) *The site of the bite*. The venom will produce more toxic effects if the bitten area is vascular, e.g., back, abdomen, chest, face and proximal portions of the limbs, and if the wound is very deep. The danger is less when the bitten part is less vascular as in the case of fingers, toes, hands, feet and forelimbs. (3) *The age of the person bitten*. This is also important, as children and old people have much less resistance than adult and vigorous people. Children succumb more quickly because they have a far smaller volume of blood in proportion to the body surface. The mental condition of the patient has also a good deal to do with the onset of symptoms. A woman or a neurotic individual will collapse sooner than an adult or a courageous man. Lastly, the treatment also depends upon the time that has elapsed between the infliction of the wound and the availability of medical aid and the depth of the venom intoxication.

In a previous paper the present authors have reviewed the treatments of snake bite in vogue. All these aim at the prevention of absorption of the venom into the general circulation by fixing it locally at the site of the bite, by coagulating and oxidising substances such as injections of potassium permanganate (2 to 5 per cent solution) or gold chloride (1 to 2 per cent), palladium dihydrochloride, hydrogen peroxide, calcium chloride (2 per cent) or cauterization of the wound. The venom may be drained out of the wound by different mechanical and surgical means such as incision, cupping or suction and squeezing out of the wound or by venesection.

The indications and uses of specific polyvalent antivenene as a specific remedy have also been discussed in detail. There is a long list of indigenous remedies said to be specific against snake bite. We have had occasion lately to test a good number of these remedies but none of them were found efficacious in experimental animals in whom a certain lethal dose of cobra

or viper venom was injected. Mhaskar and Caius (1931) mention no less than 300 indigenous plant remedies reputed as snake-bite cures but none of them were effective. Lauder Brunton introduced a lancet with a container for potassium permanganate to be used in emergency cases of snake bite. It was found to be very useful for workers in the field. Recently a cheap and compact 'Asepto' snake-bite suction outfit has been put on the market by Becton, Dickinson and Co., Rutherford, N.J. It consists of a safety razor blade for quick incision of the bitten area, two small tubes of Ioply (Iodine solution in proportion of 3.5 gm. in 100 c.cm. of 50 per cent alcohol), a strong suction bulb, and a rubber band to be used as a tourniquet. All these are put up in a strong metal tube 2 × 4 inches that can be easily carried in the pocket. Whatever treatment is to be applied, the initial local incision, suction and application of a coagulant into the wound to fix the venom locally is very essential, and hence this compact suction outfit will be found very useful for people in the field when other drugs and specific antivenene are not readily available.

In the introduction to this paper we said that it is only 20 to 25 per cent of the victims who really require specific treatment or drastic surgical measures. In the balance, the bite may be from non-poisonous snakes or the patient may have only received a sub-lethal dose of the venom. In almost all the cases, therefore, particular attention should be paid to preventing the 'fear collapse' and the actual shock due to absorption of the venom into the general circulation. Attention to this may save a large number of the victims and may at least give time for application of the specific remedy in the really serious cases. The management of such sequelæ as respiratory failure and circulatory failure from 'fear shock' is important and urgent and we propose to discuss it in detail.

(b) *Respiratory disturbances*.—These are more manifest with colubrine bites. The cobra and krait venoms have a particularly marked effect on the respiratory and later on the vasomotor centres. There is slight stimulation of these centres at first, followed by paralysis giving rise to a shallow and rapid respiration, which later becomes diaphragmatic in type and may end in asphyxia and convulsions.

The heart seems not to be much affected and continues to beat for a much longer time, even after cessation of respiration. Kellaway, Cherry and William (1932) showed that almost all the Australian snake venoms including Indian Colubrids (*Naia Naia* and *Naia hannah*) and the dreaded sea snake (*Enhydrina schistosa*) cause death by peripheral action. The phrenic nerve in the neck was placed over electrodes connected to an amplifier and a loud speaker. Different venoms were injected intravenously in divided doses and in big doses, to cause failure of the respiratory movements. When respiration became asphyxial in type artificial respiration

was started. The strong action-currents generated in the centre and travelling downwards were heard through the loud speaker. After injections of cobra venom the action-currents were heard, these increased when artificial respiration was reduced and decreased when the artificial respiration was increased. It was further seen that the nuclei of the respiratory centre in the medulla were not very much affected and could be revived if artificial respiration was continued for a length of time sufficient to oxygenate the blood. These experiments show that artificial respiration should be started at once and should be kept going as long as the heart is beating or as long as the least signs of life are present. Oxygen, carbon dioxide or both together may be tried. Artificial respiration specially with a gas mixture containing 5 to 10 per cent of CO_2 is highly effective as a single resuscitation measure. The best practical method of administering CO_2 is to ask the patient to breathe through a mask or through a rubber bag again and again. In this way the person breathes his own expired air repeatedly and thus the CO_2 intake is increased. Dilatation of the rectum with the fingers is also a good emergency measure for stimulating the respiration. Strychnine and cardiazol are worth trying in cases of respiratory failure. Koll (1937) has reported that cardiazol (metrazol) and strychnine have a marked restorative effect and completely antagonize the effects of narcotics on the higher centres. In narcosis the reflex synaptic field is very much affected. Cardiazol and strychnine reinforce one another to improve the synaptic union of the reflex arcs. Cardiazol has the additional advantage of combining the properties of a respiratory stimulant with those of a cardiac and circulatory tonic. As much as 5 to 10 c.cm. of a 10 per cent solution can be given intravenously or intramuscularly without any ill effects. Becmann (Knoll, 1938) recommended intravenous injections of 1 c.cm. of cardiazol ephedrine in cases of snake bite. Morawitz (Knoll, 1938) and Lesche recommended this drug in cases of viper bites as well. We consider that cardiazol-ephedrine may be recommended as first aid in all cases where respiratory disturbances are apprehended. Vellard (1929) in his experiments on animals, regarding the use of specific drugs as an auxiliary treatment of snake bite, reported that sparteine in 15 mgm. doses completely protected against the venom of *Crotalus terrificus* and alleviated the symptoms caused by cobra venom. Strychnine (0.04 mgm.) protected against lachesis and jararaca; adrenaline (0.05 mgm.) protected against lachesis, jararaca and cobra venom and alleviated the symptoms of *C. terrificus*; pilocarpine (20 mgm.) completely protected against cobra venom; caffeine (20 mgm.) protected against jararaca and cobra venoms. Similarly, magnesium chloride completely protected against cobra venom. Morphine, cocaine, atropine, digitaline and camphor-in-oil and alcohol had no

protective action at all. It is quite likely that the above drugs may have some value in the treatment of snake bite. Coramine in 25 per cent solution may also be used orally or hypodermically. In serious cases 5 to 15 c.cm. of this drug, intravenously, stimulate the vital centres. It is therefore a cardiac and a respiratory stimulant and has proved of marked value as a restorative in collapse and asphyxia due to narcotic drugs and poisoning, as in snake bite and electrocution accidents. Icoral, a mixture of coramine and ephedrine derivatives, is marketed as a remedy against shock and anaesthesia accidents. It has a marked stimulant action on the medullary centres and therefore may be useful against colubrine poisoning. Barlow (1935), while discussing the use of respiratory stimulants so far used, mentioned lobeline, strychnine, picrotoxin, caffeine, cocaine, camphor (including coramine, cardiazol and hexatone) and ephedrine and suggested that there is no unanimity of opinion with regard to their value as analeptics. Judging their usefulness by the degree of improvement in respiration, circulation and reflex excitability, and hastening of recovery, drugs and measures in order of their effectiveness are picrotoxin, cardiazol, ephedrine, artificial respiration, coramine, icoral, strychnine and caffeine sodiobenzoate. The respiratory stimulant effects of cardiazol exceed those of any other preparation tested by him both as regards the speed and degree of action. Improvement in circulation is often the result of improvement in respiration. Excessive doses of cardiazol are liable to produce convulsions. Ephedrine and icoral may be used with good effect.

In a series of cats we gave toxic doses of cobra venom, and when the fall of blood pressure and respiratory irregularity developed, cardiazol was administered intravenously without supplementary artificial respiration. In some cases cardiazol-ephedrine combination was used in place of cardiazol alone. It was observed that this combination restored the respiration and blood pressure more promptly than artificial respiration alone. In intact animals when a state of coma and respiratory difficulty was produced with cobra venom, cardiazol-ephedrine injection and artificial respiration restored the animal to a great extent. We are of opinion that these drugs administered in addition to antivenene in cases of emergency may act as good restoratives, and if specific antivenene is not available these remedies may be of value in saving life in a certain number of cases.

(c) *Circulatory failure.*—Cobra venom acts primarily on the respiratory system, the heart and the circulatory system being affected in later stages. With fatal doses its action on the heart is similar to that of digitalis poisoning. Gunn and Epstein (1933) have reported that the action of the 'black neck' and cape-cobra on the toad's heart is more or less like that of digitoxin and not like that of sapotoxin. Toxic

from losing consciousness and getting into a state of collapse in a short time.

(d) *Hæmorrhages*.—Extensive bleeding occurs usually in the case of viper bite. In early cases the hæmorrhage occurs only at the site of the bite, in the form of constant oozing of the blood from the fang punctures. This symptom itself is of diagnostic importance in distinguishing between a colubrine and viperine bite. Later, the bleeding occurs in the form of petechial spots under the skin, the beds of the nails and in the submucosa, e.g., from the nose and eyes, and in form of hæmoptysis and hæmatemesis. Even instances of bleeding per urethram and per vaginam have been observed. These hæmorrhages occur as late symptoms in viper bites. Often the blood becomes so poor in its coagulation power that it becomes very difficult to prevent these constant internal hæmorrhages. A few years ago advice was sought from us by telegram with regard to a person who was bitten by a viper more than two weeks earlier. The bleeding commenced about ten days after the bite and all remedies had failed to stop it. Therefore if a case is bitten by a viper, in addition to other treatment, coagulants should be given to prevent this complication. Calcium lactate by the mouth or intravenous injection of calcium chloride is often very useful. Other drugs such as coagulin (Ciba), hæmoplastin (P. D. & Co.), and Congo red 10 c.cm. of a 5 to 10 per cent solution intravenously may be tried. Injections of normal horse serum are useful. Mixed antivenene in doses of 40 to 60 c.cm. has often been found to act as a good hæmostatic. Stockton and Franklin (1931) used antivenene in cases of purpura and uterine hæmorrhages. Vitamin C in doses of 0.05 to 0.1 gm. intravenously may be given daily or on alternate days. In viper bite, bleeding is due to the damage of the endothelial cell lining of the terminal blood vessels in the sub-cutaneous and sub-mucous tissues. Vitamin C strengthens and restores the tone of these damaged cells and so prevents the leakage of the blood from this source. Sajidiman (1937) reported that in a case of bite from *Bungarus fasciatus* there was occurrence of hæmorrhage from all parts of the body, delay in coagulation time, prolongation of bleeding time, severe thrombocytopœnia, increased sedimentation rate and great tendency to œdema. He injected vitamin C (Redoxon) on the ground that it possesses styptic property, promotes and increases the number of thrombocytes and probably also the serum albumin. There is no doubt that after vitamin C injections there was a striking increase in the thrombocytes. The patient recovered and, except for persistence of infiltration of the bitten leg and some local pain, other symptoms disappeared.

Discussion and conclusions

We have stated that out of 110 varieties of snakes existing in India, only 69 are poisonous

and out of these only 40 (39 per cent) are poisonous land snakes. In other words, it may be concluded in general that out of the 100 bites excluding sea snakes, there may be only 40 to 50 per cent bites by poisonous land snakes. Of the bites from these poisonous snakes some may be non-lethal from various reasons. Therefore only in 20 to 25 per cent of all the bites are the victims in real danger and for these unfortunate individuals it may not be possible to do much since the specific drugs and expert medical aid is not always readily available in out-of-the-way places where such accidents usually occur. Of the bitten, 80 per cent who have received non-lethal doses of snake venom or are bitten by non-poisonous snakes, many suffer from severe shock due to fear of impending death. Assurance to them in addition to immediate symptomatic treatment will save many who would otherwise die, probably of 'fear-shock' instead of real venom poisoning. In addition to the specific remedies such as intravenous polyvalent antivenene, the use of other measures such as ligature, incision, venesection, local use of potassium permanganate, gold chloride, etc., the patient may be saved if the other serious complications that occur after the bite can be treated. In the case of cobra bites the venom effects the respiratory centre particularly, in addition to its effects on the other centres in the brain. Cardiazol, ephedrine and veritol have been reported to be useful in counteracting the respiratory failure and have a stimulating effect in narcotic poisoning. These are therefore indicated in cobra poisoning. Artificial respiration and inhalation of CO₂ should also be employed to stimulate the respiratory centre. In the case of viper poisoning there is fall of blood pressure from acute dilatation and later paralysis of blood vessels, particularly of the splachnic area. Drugs such as pituitrin and veritol have been shown to contract such organs as the spleen, liver, intestines and push the blood into the general circulation. Veritol has the advantage as it pushes out the blood and unlike adrenaline it does not constrict the blood vessels and in this way increase the peripheral resistance. These drugs along with perfusion of physiological saline with gum acacia and glucose have been experimentally shown to revive animals in a condition of collapse and may be useful in human beings as well. For subsequent hæmorrhages intravenous injections of calcium chloride, Congo red, normal horse serum, coagulin and vitamin C are worth trying.

A FEW POINTS IN THE CLASSIFICATION AND IDENTIFICATION OF POISONOUS AND NON-POISONOUS SNAKES IN INDIA

Zoologists and medical men have attempted to provide intelligible guides to enable lay people to distinguish at sight the poisonous from non-poisonous snakes. Amongst the commonest species met with in the Indian Empire may be

mentioned the carpet-snake (*Lycodon aulicus*), the rat-snake or dhaman (*Ptyas mucosus*), the grass and the water snakes (*Rhabdophis stolicus* and *Nerodia*), the tree or whip-snake (*Dryophis nigriventris*), the cobra (*Naia naia*), the krait (*Bungarus candidus*) and the deadly Russell's viper (*Viper russelli*). The sea-snakes (*Hydrophynæ*) with a strong compressed, ear-shaped tail are also common on the Indian coasts, the most widely distributed being *Hydruis platurus* and *Enhydrine valakadieu*. The latter is known to be the most poisonous of all Indian snakes. There are other snakes not so well known but which, nevertheless, deserve mention. The burrowing 'earth-snakes' (*Uroplutidae*) are peculiar to the hilly tracts of peninsular India and Ceylon, while the small worm-like subterranean snake (*Typhlops*) is widely distributed all over the Indian Empire. Of the latter (*Typhlops braminus*) is the commonest. The best known python or rock-snake of India is *Python molurus*. The so-called double-headed snake kept by snake charmers in this country is *Eryx jaculus* which lives in sandy tracts of Southern and N. W. India. *Cerberus rynchops* lives in mud on the banks of large rivers and estuaries of the Indian region and feeds on fish. The raj-samp or banded kraits (*Bungarus candidus*) of North India are common all over the country and are very destructive to life. The king cobra (*Naia hannah*) is confined to parts of south and eastern India, Burma, and the Andamans, is of fierce and aggressive habits and feeds on other snakes. *Echis carinata*, another fierce snake of the viper class, is to be met with in the desert sandy tracts of India. The pit-vipers are represented in India by two species only, e.g., *Ancistrodon himalayensis* common in N. W. Himalayas and Assam and *A. hypnale* in Ceylon and Western Ghats.

There is no golden rule for identification of the poisonous or harmless snakes save examination of teeth and the head shields, a procedure that is seldom practicable for lay people.

To meet this requirement, various criteria have been proposed by specialists, none of which, however, is satisfactory.

There are snakes of striking resemblance but absolutely of different affinities, e.g.

- A. 1. *Echis carinata* (poisonous).
2. *Dispsadomorphus trigonatus* (non-poisonous).
- B. 1. *Bungarus caeruleus* (poisonous).
2. *Lycodon aulicus* (non-poisonous).
- C. 1. *Bungarus fasciatus* (poisonous).
2. *Hydrophotus davisoni* (non-poisonous).

In short, nothing but an examination of the dentition can afford positive information as to the poisonous or non-poisonous nature of an unknown snake.

In a previous paper (1935) the present authors described the classification of snakes as given

by Wall and the identification marks as described by him. The quick and easy way of classifying a snake is as follows:—(a) Lay the snake on its back and look at the scales on its abdomen. If the ventral scales are large and run right across the abdomen so that no dorsal scales are visible on either side of the abdomen, the snake is most probably poisonous. (b) Lay the snake on its abdomen and look on its dorsal surface. If the head is long and triangular in shape and is distinctly marked off from the body by a constricted neck and if the scales on the head are of the same size as those on the back, the snake is a viper. The head looks almost like that of a lizard. (c) Some vipers have a small depression situated between the eyes and the nose (loreal pit). These are known as *pit vipers*. Of the pit-less vipers the varieties commonly met with are *Echis carinatus* (Indian Phooras) and Russell's viper (Indian Daboia). The former has imbricated or saw-shaped scales on its body and has a bird's foot-print or broad arrow mark on its head and two rows of dark-coloured wavy bands running longitudinally along its back. In the case of Russell's viper there are three rows of circular or oval rings on its body. These rings vary in size and colour. All the vipers are poisonous to man. (d) If the scales on the head are broad, unequal, and larger than those on the body and look like shields, then the specimen is either a coral snake, a cobra or a krait. In the case of a cobra the neck is expandable in the form of a hood and may have a single ring mark (monocellate) or a double ring in the form of spectacle (binocellate) or there may be some black spots on the internal surface of the hood. The third supralabial scale touches both the eye and the nostril. This is an important diagnostic feature in a cobra. (e) The krait has only four submaxillary scales of which the fourth is the largest in size. The spinal scales, i.e., those situated on the vertebral column, are hexagonal in shape and larger than other scales on the back. There may also be transverse bands of different colours on the body.

These are a few of the distinctive features by which a poisonous snake may easily be identified. (In case of emergency this much is enough to differentiate a poisonous from a non-poisonous snake.) For the detailed study on the classification of snakes more elaborate works on the subject must be consulted. For ready reference Gharpurey (1935) has tabulated the classification of snakes as given below:—

In addition to the above scheme a few more points are given for confirmatory identification of poisonous snakes. It is not easy to make out all the points which are given below in small-sized reptiles or in snakes which have been badly bruised or crushed or have been macerated before they reach an expert for opinion. Still, before any opinion is given as many points as possible must be looked for.

TABLE
(Modified after Gharpurey's table)
Snakes.

Tail compressed side ways and flat. (Sea snakes, poisonous.)		Tail cylindrical and not compressed. (Land snakes, poisonous and non-poisonous.)	
Small scales on the abdomen as well as on the back. (Non-poisonous.)		Abdominal scales not extending right across it. (Non-poisonous.)	
Small scales on the head. (Non-pit vipers, poisonous.)		Abdominal scales covering the entire width of the abdomen. (Poisonous and non-poisonous.)	
Two rows of wavy bands on back, Government arrow mark on head. (Echis carinatus.)		Small scales on the head, a loreal pit between the nose and the eye. Pit-viper. (Poisonous.) { Ancistrodon himalayanus. } { Ancistrodon hypnale. }	
Third supra-labial touches the eye and the nostril. Cobras and coral snakes. (Poisonous.)		Shields on the head. Cobras and kraits. (Poisonous.)	
Neck with hood and markings. Cobras.		Scales in the central row on the back are enlarged and hexagonal and coloured bands or half rings across the back. Subcaudals undivided. Only four infra-labial scales, and the fourth is the largest. Krait. (Poisonous.)	
None of the characteristics mentioned in no. 1 or 2. (Non-poisonous.)		None of the characteristics mentioned in no. 1 or 2. (Non-poisonous.)	
With coral coloured spots near the vent. Coral snakes.		Three rows of oval spots on back. Russell viper.	

The colour and scales

The coloration of snakes is not always diagnostic. Although many snakes have definite colour and characteristic marks on their bodies, it is not possible to differentiate a poisonous from a non-poisonous snake by these characters alone. It may be mentioned that coral snakes and kraits have bright-coloured transverse bands on the body; Russell's vipers have about three rows of black and brown rings, and *Echis carinatus* show two dark wavy bands on the backs. Many of the non-poisonous snakes such as grass snakes, tree snakes and bamboo snakes have beautiful colour patterns on their bodies and have a long thin whip-like tail. Usually a snake with vivid colour-markings is popularly considered as dangerous and poisonous but this is not always so. Snakes generally change their colour according to the season, their age and surroundings.

Scales.—The body of all snakes is covered with scales. The scales on the back are usually quadrilateral in shape and are called 'costals' and those along the vertebral column the 'vertebrals' or 'spinals'. The scales on the abdomen are called the 'ventrals'. These ventral scales are usually broad and help in forward movement. The dorsal and ventral scales are similar in size and shape in the case of harmless blind snakes and burrowing snakes. The vertebral scales in the krait are hexagonal in shape and larger than the rest of the dorsals. The ventral scales stretch right across the abdomen in the case of poisonous snakes and in non-poisonous snakes they are small and do not stretch across, but are restricted only to the middle of the abdomen. The scales on the head are also characteristic in poisonous snakes. They are large, glossy and the shape of a shield in the case of cobras. The third supra-labial scale touches both the nostril and the eye in the case of cobras and the coral snakes. Similarly the submaxillary scales are characteristic in kraits, there being only four submaxillary scales of which the fourth is the largest.

In *Echis carinatus* the dorsal scales are rough and imbricated. In pit vipers there is a depression situated between the nose and the eyes called a *loreal pit*. This depression is a rudimentary homologue of the tear sac in mammalia.

Tail.—It is usually flattened and compressed laterally like an oar in the case of sea snakes and is round in land snakes. The tail is usually blunt and ends abruptly beyond the vent in vipers. The scales on the under surface of the tail are usually divided beyond the cloaca in the case of a cobra, but entire in the case of a krait.

Head.—In vipers the head is triangular in shape and is marked off from the body by a constricted neck. The scales on the head are similar to those on the body, the eyes are small and the pupils elliptical. In the case of cobras and kraits there is usually a mental groove beneath the chin. There is a distinct expansile

hood with or without single ring (monocle) or double ring (spectacle) on the back and dark patches on the under surface of the hood. In the case of *Echis carinatus* there is a bird footprint or broad arrow mark on the head.

Fangs.—In the case of poisonous snakes the maxillary teeth are enlarged and are called fangs. These fangs may be placed in the front of the upper jaw (*proteroglypha*) or at the back of the upper jaw (*opisthoglypha*). Snakes with fangs in the front part of the jaw are poisonous to man. These fangs sometimes measure $\frac{1}{2}$ to $\frac{3}{4}$ inch in length and are either grooved or canalized.

Vipers usually have very large fangs. If a pin is passed along the upper jaw, it is caught against the maxillary teeth, in the case of non-poisonous snakes. In the case of poisonous snakes no teeth are felt behind the fangs. In this way it is quite easy to locate the fangs in a living snake or even in a snake whose body has been badly crushed.

If the snake has not been caught or killed it may be sometimes necessary to determine whether the bite is from a poisonous or non-poisonous snake or if the bite was from a poisonous colubrine or a viperine snake. There are one or two deep punctures or scratches on the skin in the case of a bite from a poisonous snake; and there may be rapidly developing swelling and distinct oozing of the blood at the site of the puncture.

If the snake has been caught and there be still difficulty in identifying it, the authors will be glad to help in the identification of such specimens. The snake may be put in a wide-mouthed bottle and packed in methylated spirit or in 10 per cent formalin and despatched to them as soon as possible. The snakes may also be sent to Bombay Natural History Society, 6, Apollo Street, Bombay, or to the Zoological Survey of India, Chowringhee, Calcutta, for identification.

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Medical News

THE ROCKEFELLER FOUNDATION. REVIEW OF WORK IN 1938

THE YEAR IN BRIEF

DURING 1938 The Rockefeller Foundation appropriated a total sum of over \$15,000,000. Of this amount, speaking in terms of rough classifications, \$3,800,000 was given to the medical sciences, \$3,800,000 to the social sciences, \$3,000,000 to the natural sciences, \$2,500,000 to public health, \$1,000,000 to the humanities and \$300,000 to rural reconstruction in China.

The Foundation's income during 1938 amounted approximately to \$7,000,000. In appropriating \$15,000,000 it was necessary, therefore, not only to use up the balance carried over from earlier years, but to dip into the principal fund to the extent of \$3,755,000.

In carrying out its 1938 programme the Foundation operated in forty-two countries in all parts of the world. Eighteen of these countries were in Europe, five in Asia, two in Africa, five in South America, ten in North and Central America and the West Indies, and two were islands of the Pacific.

Twenty-five per cent of the money given went to foreign countries, and the remainder, 75 per cent was for work in the United States.

To the China Medical Board; the Foundation gave \$1,580,000, under an earlier authorization, for expenditure over a period of approximately four years. Previously the Foundation had made annual appropriations to this Board toward the maintenance of the Peiping Union Medical College. Support over a relatively long period has now been given to enable both the Board and the College to plan with reasonable assurance for the immediate future.

To the American University of Beirut, the Foundation appropriated \$1,000,000 toward the endowment of its medical school, including nursing and premedical subjects. This action has been in contemplation for a number of years, and it is now believed that the University is in a position to raise the supplementary sums required and thus make a substantial addition to its resources.

Preventive medicine is then discussed in greater detail. Social insurance is treated in a special chapter and notes presented on nutrition, physical training, rural planning, and the education of rural populations in health matters. Another chapter is devoted to 'the training of doctors and their assistants in preventive and social action'.

Dr. J. de Barros Barreto, Director-General of Health in Brazil, draws attention to conditions in South American countries in discussing curative medicine in rural areas. In this article Dr. Barreto expounds the organization of medical care in all its aspects and examines in turn the financing of such a scheme, the establishment of a network of hospitals in large thinly-populated regions, the creation of dispensaries and the provision of drugs. He concludes with an examination of the much-canvassed problem of a State Medical Service.

The International Lists of Causes of Death adopted by the fifth International Conference on Revision, which sat in Paris from 3rd to 7th October, 1938, are also published in this number of the *Bulletin*. This conference resulted in the signature of a Convention recommending to Governments, as from 1st January, 1940, the adoption of three revised international lists: detailed (200 headings), intermediate (87 headings), and abridged (44 headings).

The Present Use of Naturalistic Measures in the Control of Malaria by L. W. Hackett, P. F. Russell, J. W. Scharff and R. S. White, is the title of the *Bulletin's* final article.

In including this problem, the malaria commission of the League of Nations had in mind the questions raised by rural malaria in poor countries. The article deals with the first step towards the solution of the problem by critically surveying all action taken so far on naturalistic lines. This is defined as 'the deliberate extension or intensification of natural processes which tend to limit the production of mosquitoes or their contact with man'. The authors stress the desirability of creating experimental centres and of ascertaining the cost of methods before applying them.

BULLETIN OF THE HEALTH ORGANIZATION, VOL. VII, NO. 6

THE latest issue of the *Bulletin of the Health Organization* is mainly devoted to rural life problems.

The League of Nations is at present engaged in preparations for the technical discussions of the forthcoming European Conference on Rural Life on questions of medico-social policy. For this purpose the Health Organization has prepared a technical document, *General Survey of Medico-Social Policy in Rural Areas*, which begins with an examination of the part played by curative medicine in rural areas.

GUIDING PRINCIPLES FOR STUDIES ON THE NUTRITION OF POPULATIONS

THE Health Organization of the League of Nations has just published a handbook entitled *Guiding Principles for Studies on the Nutrition of Populations* by Professor E. J. Bigwood, of Brussels University.

The author has endeavoured to work out methods of enquiry which can be generally applied as to the actual food consumption and the state of nutrition of given population groups. The handbook is divided into two parts:

A. *Dietary surveys*

There are four types of dietary survey: investigations may extend over a whole country, or be limited to population groups, to families, or to individuals.

The author describes the technique of these surveys—weighing methods; method of records in household books, questionnaire method, etc.; he then deals with the analysis of the collected data from the standpoint of the physiology of nutrition and with the scales of family consumption coefficients which have to be used in comparing the results of enquiries concerned with groups of different age and sex composition.

The last two chapters of part I deal with diets from the economic standpoint and the statistical significance to be assigned to the results of surveys.

B. *Enquiries into the state of nutrition of populations*

In this part of his handbook the author discusses the somatometric (biometric, clinical and physiological) methods that may be suitably employed in these investigations. Special attention is given to the physiological methods, especially those for detecting latent hypovitaminoses and iron deficiency.

The handbook is completed by examples of surveys of various types in a number of different countries; it also comprises a terminological index and bibliographical references.

DIGITALIS PREPARATIONS SOLD IN INDIA

THAT a large proportion of digitalis preparations sold in India is below par in quality is a recent finding of the Biochemical Standardization Laboratory, Calcutta, which, since its inception nearly two years ago, has been making an all-India survey of the quality of medicinal preparations for which definite and recognized standards of comparison are available.

In the interests of patients and of scientific medical practice, it seems imperative that some form of control should be exercised by the State over drugs like digitalis.

All digitalis preparations issued for sale, it is suggested, should be tested and their potency controlled before they are released. Strict precaution should be enjoined regarding their storage in cool and dark places, preferably in cold storage where possible. All digitalis tinctures more than a year old should be re-tested for their potency, and if found below par, immediately withdrawn from clinical use.

The reasons why digitalis preparations sold in India have been found below standard quality are not clearly understood. A good deal of research has been carried out both in India and abroad regarding the stability of digitalis preparations, and it is now generally recognized that the glucosides of digitalis deteriorate at a fairly rapid rate when stored in a high temperature. Therefore, the hot and humid climate of India may bring about a rapid deterioration of all digitalis preparations, locally-made or imported from abroad.

The survey on which the Biochemical Standardization Laboratory bases its conclusions may be said to be fairly representative of the conditions existing in India. For the purpose of analyses, samples were obtained from practically all the provinces in British India. Altogether 110 samples were analysed biologically up to the end of 1938. These consisted of 102 digitalis tinctures, 4 dried leaves of digitalis and 4 digitalis powders.

Of this number, 87 were found to be below 80 per cent in strength compared to the international standard and 57 were below 50 per cent potency.

One hundred and two samples in this group were of Indian origin as was evident from the labels on the containers and only 8 of foreign make. It is not known whether the digitalis tinctures with Indian labels were prepared from leaf grown in India or from imported leaf.

QUININE CULTIVATION IN INDIA

'INDIA contains enough first-class land for an early resumption of cinchona growing', observes Mr. A.

Wilson, Deputy Director of Agriculture, Cinchona, Madras, in the Imperial Council of Agricultural Research, *Miscellaneous Bulletin* No. 29.

India produces only 70,000 lb. of quinine but consumes 210,000 lb. and therefore import 140,000 lb. mainly from Java. India's real need of quinine, however, has been estimated at 600,000 lb., hence the importance of extending cinchona cultivation in India.

The Royal Commission on Agriculture emphasized the importance of cheap quinine. On the advice of the Indian Research Fund Association, the Central Advisory Board of Health in July 1937 resolved that an officer experienced in cinchona cultivation should investigate areas most suited to its cultivation and the cost of production. The Imperial Council of Agricultural Research arranged and financed this investigation.

The two most important species utilized by cinchona plantations in India are known as *Cinchona ledgeriana* which predominates in Bengal, and *Cinchona succubra*, the red bark variety. The latter presents certain advantages for certain soils and elevations but the former, the principal variety in Bengal, has much greater commercial potentialities especially on account of its high content of the invaluable alkaloid.

There are one hundred million sufferers from malaria in India calling for an annual supply of some 600,000 lb. of quinine sulphate, or its equivalent in other forms. Immediately 38,000 acres of first-class cinchona land is available, and this is distributed in Bengal, Assam, Orissa, Bhutan, Sikkim, Madras, Travancore, Cochin, Mysore and Coorg. Much of the hill land which is not yet fully explored showed promise and will require further investigation in the future.

INDIAN-GROWN DRUGS

SAMPLES of valuable drugs from Kashmir hills have recently been acquired for exhibition in the Industrial Section of the Indian Museum (Botanical Survey of India). Most of these drugs are imported at present. If cultivated and manufactured in India all the requirements of the country could be met.

One of these is *Atropa belladonna* which grows in the Himalayan ranges at an altitude of 6,000 to 12,000 ft. In past years considerable quantities of the drug were exported from, and finished medicinal preparations imported into, India but in recent years, Indian pharmaceutical firms have begun manufacturing certain preparations of this potent drug. The export of the plant has consequently decreased.

Indian rhubarb or *rewand-chini* (*Rheum emodi*) is found growing wild in various parts of Nepal and Sikkim at altitudes of 4,000 to 12,000 ft. The Indian rhubarb is as good as the rhubarb imported from China.

Podophyllum emodi or *papra* (Hind.) is a small herbaceous plant in great demand by drug manufacturers. It is found growing wild from Sikkim Himalayas to the North-West Frontier.

As the local drug is indiscriminately collected and prepared, the American drug, *Podophyllum peltatum*, is still in demand by the Indian manufacturers. There is little uniformity of strength of the active principle in the drug collected in India. Its systematic cultivation may pay the investor, for the Indian product is much superior to the American species in strength of active principle.

SOURCE OF SANTONIN

Artemisia or *kirmala* (Hind.) is the source of the valuable drug santonin. The plant with a number of varieties is found growing in Kurram Valley and in Kashmir and one of them—*Artemisia maritima*—has been found to contain the valuable drug santonin. This plant is waiting for an enterprising manufacturer.

Another plant which is reported to be found growing wild in Kashmir Hills is *Hyoscyamus niger* or *khurasani ajowan*. Recently brought under cultivation, it gives the required percentage of alkaloid and has a good prospect of competing with the imported material, provided the prices are kept low.

Indian valerian or *Valeriana wallichii* grows wild in the mountain ranges extending from Kashmir to Bhutan

at altitudes ranging from 4,000 to 12,000 ft. If properly collected, it can replace the imported rhizomes of *Valeriana officinalis*.

Commonly known as foxglove, *Digitalis purpurea* was formerly imported into India, but in recent years the plant has been extensively cultivated in Darjeeling and Kashmir Hills and India has now little need to import this valuable drug from abroad.

OIL OF JUNIPER

The oil obtained from the berries of *Juniperus communis* and another species—*J. macropoda*—is of pharmaceutical importance. At present most of the oil is imported into India and it is worth while exploring commercial possibilities of this drug plant, found in plenty in the Western Himalayas.

A herbaceous plant and its seeds, *Plantago ovata* or *isabghul*, are in great demand. The plant grows in the lower hills as well as in the Punjab and Sind plains. A large quantity of the seeds is still imported into India, but by judicious cultivation India can meet her own needs.

The plant *surinjan* or *Colchicum luteum* is extensively found in the western temperate Himalayas, and the drug forms a good substitute for the official drug.

Aconitum chasmanthum grows abundantly in Kashmir. The root is regarded as an Indian substitute for the European drug obtained from *Aconitum napellus*.

THE TWELFTH MEETING OF THE ROSS INSTITUTE INDUSTRIAL ADVISORY COMMITTEE

IN addition to a great many interesting observations on important matters of health in many parts of the tropics the following brief abstract is of special interest to India:—

REORGANIZATION OF THE INDIA BRANCH OF THE ROSS INSTITUTE

Sir Malcolm Watson said:—I would like to express the thanks of the Standing Committee of the Ross Institute to Mr. E. A. Watson who has taken a very deep interest in this matter, and I am sure that it is very largely due to him that we have been able to get these very busy men in India to give some of their valuable time to the work of the Ross Institute.

I have been seeing in the last month or so many reports, sent to me by Dr. Ramsay, from medical officers and estate managers in many parts of India on the results which have come from the control of malaria, and it is quite evident that the number of people who are convinced of the economic value of malaria control is steadily increasing.

It is many years since I was in India, and I hope on my return from Rhodesia to visit India and have an opportunity of seeing for myself the work which has been done. But to read these accounts of the varied conditions that are being controlled in India makes me wish I could go next week instead of a few months hence. It is evident that a great and valuable work is being done there by the co-operation of the Ross Institute and the estate medical officers. It is very satisfactory to read that some places that used to be hotbeds of blackwater fever have not had a case for years. I remember that in 1908 the European population in the Dooars was almost threatened with extinction owing to malaria and blackwater fever.

We are trying to get a standard report for the use of tea estates and Dr. B. A. Lamprell, who is here to-day, has been deputed by the Assam Branch of the British Medical Association to co-operate with the London School of Hygiene and Tropical Medicine, in getting out a standard form of report for the tea estates. I am sure it will be a great help to the medical men to express in figures the results of their work. It will show whether they are getting results or not, and if they are spending their money wisely.

Dr. Lamprell spoke on the subject of medical statistics in the tea industry in Assam:—

The present position is unsatisfactory, and health returns often convey little. There is no uniformity in

the returns, and in some instances the figures representing malaria sick rates, total sick rates, etc., on estates, are not comparable even with the corresponding figures for the same estate in the previous year.

The matter was brought up at the meeting of the Assam Branch of the British Medical Association in 1932, and then it was agreed that some degree of uniformity in health returns for the industry was desirable. A committee was formed to make recommendations, but was unable to come to any agreement as to the best type of standard form. The matter was raised again in 1938, and at a General Meeting of the Branch it was unanimously agreed that uniformity in returning certain essential figures was most desirable.

Proper health returns are necessary in any public health organization, but in medical departments of industrial concerns they are obviously essential. The figures of sickness due to malaria, dysentery and other diseases of economic importance should indicate clearly the extent to which loss of work and life occurs from these causes. It is only when a clear idea is obtained of the cost of disease that there can be an assessment of the extent to which expenditure or prevention is economic.

I sincerely hope that with the help of the Department of Vital Statistics of the London School of Hygiene and Tropical Medicine it will be possible to draw up some monthly and annual forms for health returns which will be widely acceptable to the tea industry in Northern India.

A CAREER FOR EDUCATED WOMEN

'WHERE can we obtain trained health visitors' is a question which is being asked repeatedly by progressive Municipal Committees and District Boards. Educated Indian women are needed, in larger numbers than are at present coming forward for training, to meet this demand, which is the result of a growing appreciation of the importance to the nation of the health and well-being of the mother and child.

One of the reasons for the present lack of sufficient applicants for health visitors' training may be ignorance of the openings for women which this profession offers. It is certain that the work should make a strong appeal to educated Indian women, because it provides an occupation which is full of human interest and of great social value.

The health visitor after training is employed by local authorities or voluntary organizations for work in connection with maternity and child welfare schemes. She is usually attached to a welfare centre. Her duties include the holding of clinics in the welfare centre and the visiting of women and children in the homes. The training of *dais*, the supervision of midwives and health propaganda of various kinds are other aspects of her work. A health visitor does not attempt to cure disease but she endeavours by friendly advice to educate parents as to how they may bring up their children to be strong and healthy.

Schools for training health visitors have been instituted in Delhi, Bombay, Poona, Lahore, Calcutta, Madras and Nagpur, and the course of training varies from 9 months to 18 months.

Applicants for admission to the schools must be over 21 years of age and should possess a diploma in midwifery; a general nursing training is an added advantage. The cost of training varies in different centres, but a considerable number of scholarships is available.

Health visitors possessing diplomas of the health schools can obtain posts on salaries starting at Rs. 70–75 p.m. in Northern India and Rs. 55–60 p.m. in Southern India. A number of more highly paid posts are available for health visitors with experience and special ability, and women taking up this profession need have no fear of being unable to earn a good living.

COUNTESS OF DUFFERIN'S FUND

EXTRACT from the Minutes of the Executive Committee of the Countess of Dufferin's Fund, held on the 5th April, 1939.

* * * *

18. To consider what further steps can be taken to assist Indian medical women apart from those in the Training Reserve who intend to study in England.

18. The chairman proposed and all agreed that assistance could be given in the following ways:—

- (a) Advice should be offered by the Dufferin Office to Indian women intending to study medicine in England.
- (b) The services of our medical adviser in London should be available for advice, and also help in emergencies.

It was agreed that publicity to these arrangements should be given through notices to medical colleges in India, to the press, letters to the High Commissioner in London, the secretary of the Students Advisory Committee in the provinces, the women assistants to the Inspector-General of Civil Hospitals, of the U. P. and Punjab. The secretary was requested to draw up suitable letters and notices for the chairman's approval.

POST-GRADUATE STUDY IN GREAT BRITAIN

WOMEN medical students and doctors who are planning post-graduate studies abroad are invited to correspond with the Chief Medical Officer, Women's Medical Service, Countess of Dufferin's Fund Office, Viceregal Estate, Simla (Summer), Red Cross Building, New Delhi (Winter), from whom advice can be obtained before leaving India about the various diplomas and courses of study available, the qualifications needed for each, and in general about facilities for residence and study abroad.

In London the services of the Countess of Dufferin's Fund Medical Adviser are also available for similar advice and help in emergencies. Applications should be made in writing to Dr. A. C. Scott, c.s.e., c/o The High Commissioner for India, India House, Aldwych, London, W.C.2.

Students are strongly advised not to leave India without assurance that they are qualified for admission to the examinations they intend to take.

(Sd.) G. STAPLETON,
Secretary.

CAMERON PRIZE FOR PROF. DOMAGK

At a meeting of the Court of Edinburgh University the Senatus reported that the Cameron prize for 1939 had been awarded to Dr. Gerhard Domagk, Institute for Experimental Pathology and Bacteriology, I. G. Farbenindustrie, Elberfeld, Germany, in recognition of his discoveries—the well-known Prontosil—which initiated the treatment of diseases of bacterial origin by compounds belonging to be sulphonamide group.

The Cameron prize is awarded to a person who, in the opinion of the Senatus, has in the five years immediately preceding the award made any highly important and valuable addition to practical therapeutics.

THE DR. B. S. SHROFF MEMORIAL GOLD MEDAL OF THE BOMBAY MEDICAL UNION

THE following subject has been selected by the Bombay Medical Union for competitive thesis for the above prize for 1939:—

'Alcohol and Alcoholic Drinks—their use and abuse in India, with special reference to their effects on Health and Disease.'

The award will be in the form of a gold medal called the Dr. B. S. Shroff Memorial Gold Medal of the Bombay Medical Union.

The competitor must be (i) a duly qualified member of the medical profession holding a degree or degrees and diplomas from Indian and other universities created by statute, or (ii) a duly qualified member of the medical profession holding the diploma of Membership of College of Physicians and Surgeons of Bombay.

The thesis must be sent in six typed copies so as to reach the Honorary Secretaries, Bombay Medical Union, Bhavatsky Lodge Building, French Bridge, Chowpatty, Bombay, on or before the 31st October, 1939.

The thesis should be designated by a motto instead of the writer's name and should be accompanied by a sealed cover containing the name of the writer and his post-office address.

The name of the prize, the year of competition, the subject of the thesis, and the writer's motto should be superscribed on the cover.

No study or essay that has been published in the medical press or elsewhere will be considered eligible for the prize, and no contribution offered in one year will be accepted in any subsequent year unless it includes evidence of further work.

The accepted thesis shall be the property of the Bombay Medical Union.

All other thesis shall be returned if not accepted provided the returned postage expenses are paid in advance by the writer.

In the award of the prize to the successful candidate, the decision of the committee shall be final.

UNITED PROVINCES MEDICAL COUNCIL

Minutes of the meeting of the United Provinces Medical Council held in the committee room of the office of the Inspector-General of Civil Hospitals, United Provinces at Lucknow on 31st March, 1939.

RESOLVED that the D.T.M. & H. and D.C.H. qualifications, granted by the Royal College of Physicians of London and the Royal College of Surgeons of England, be registered as additional qualifications.

The council unanimously rejected the suggestion that sanitary inspectors and vaccination staff should be trained and authorized to inoculate against cholera and plague. The council came to this decision after mature consideration and on weighty grounds, as the risks involved would be too serious.

Some of the members of the council having testified that to their knowledge Dr. Mahudavalla had done nothing to warrant the removal of his name from the register, it was unanimously decided that Dr. Mahudavalla's name should be included in the register.

Resolved that the name of Dr. Surendra Singh, M.D. (Vienna), may be registered.

It was resolved that the name of Dr. Kishori Kumar Mathur, M.D. (Vienna), may be registered.

The case against Dr. Jagannath Prasad Sinha, M.B., B.S. (regn. no. 2853), of Benares, was considered.

It was resolved unanimously—

That the council do judge Dr. Jagannath Prasad Sinha to have been guilty of infamous conduct in a professional respect and do direct the Registrar to erase from the medical register the name of Dr. Jagannath Prasad Sinha.

Dr. Jagannath Prasad Sinha may however apply for his name to be registered in the medical register at the end of twelve months. He must then satisfy the council that he has not done anything against the code of medical ethics.

The council unanimously endorsed the following resolution passed at the United Provinces Medical Conference held at Agra in October 1938:—

Resolved (a) that this conference notes with concern the increasing evil of quackery in United Provinces where all sorts of suffixes and prefixes simulating recognized medical degrees or diplomas are being assumed freely by unqualified persons to advertise themselves as qualified medical men and requests the Government to take necessary measures to protect the public and the profession from the consequences of this evil, and

(b) that in the opinion of this conference it is now high time that the Government should make it a penal offence for anyone to use the prefix Doctor or Dr. before his name unless he possesses a degree of doctorate from any recognized university or possesses a medical qualification from one of the medical institutions recognized either by the Indian Medical Council or one of the Provincial Medical Councils or both.

STATEMENT FROM THE MEDICAL PEACE CAMPAIGN TO MEMBERS OF THE MEDICAL PROFESSION THROUGHOUT THE WORLD

REALIZING the suffering and disease which are caused by war, and accepting our medical responsibility to prevent disease as well as to treat it when developed, we urge the governments of the world to take action to make war impossible.

In particular we suggest that, in order to combat the present emergency, Great Britain, France and Russia should declare that they stand united and determined to resist all further aggression by military force if necessary; and that the governments of these countries should invite all other countries, irrespective of their form of government, to associate themselves with this declaration.

We maintain that the only way to eliminate all possibility of future war is the establishment of the rule of international law, based on the principles of justice to all and backed, so long as this remains necessary, by overwhelming military and economic strength. To this end we urge that a conference be called to discuss the practical measures which should be taken.

Finally, as an organization representative of medical opinion and regarding medicine as the most international and humane of all professions, we would remind our colleagues in all countries of the great part which they may yet play in influencing public opinion on behalf of peace.

Signed on behalf of the Medical Peace Campaign,

JOHN A. RYLE,
President.

INDIAN MEDICAL BIRTHDAY HONOURS, 1939

THE following are the names of medical men and others, associated with medical institutions, in the Indian Honours List of date 8th June, 1939. We offer them our congratulations:—

C.I.E.

Lieutenant-Colonel R. F. D. MacGregor, Residency Surgeon, Hyderabad (Deccan).

Lieutenant-Colonel F. J. Anderson, Professor of Surgery, Medical College, Calcutta.

O.B.E.

Major Bijeta Chaudhuri, Senior Medical Officer, Port Blair.

Mr. H. R. Rishworth, Principal Medical and Health Officer, G. I. P. Railway.

M.B.E.

Miss Una Frances Marie Morton, Principal, Women's Medical School, Agra.

Rai Bahadur R. N. Banerji, Medical Practitioner, Allahabad.

Mr. A. L. Greenway, Medical Officer and Quarantine Medical Officer, Kuwait, Persian Gulf Residency.

Mr. K. S. Mitra, Secretary, Medical College Hospitals, Calcutta.

Mr. Radha Krishna, Medical Superintendent, Silver Jubilee Tuberculosis Hospital, and Tuberculosis Clinic, Delhi.

Kaisar-i-Hind Medal (First Class)

Miss Mary Firth Guyton, lately of Farrer Zenana Mission Hospital, Bhiwani, Hissar District, Punjab.

Miss Grace Stapleton, Professor of Obstetrics and Gynaecology, Lady Hardinge Medical College, New Delhi.

Kaisar-i-Hind Medal (Second Class)

Mrs. Cecilia Burgess, Provincial Organizer, Sind Provincial Branch, Indian Red Cross Society, Sind.

Mrs. Constance Sylvia Heyland, Sister in charge, Radium Institute, Prince of Wales Medical College Hospital, Patna.

Miss Maria Johanna Caroline Sophie Rasmussen, Health Worker, Child Welfare Centre, Peshawar.

Miss Violet Riggs, Nursing Superintendent, Irwin Hospital, Delhi.

Kaisar-i-Hind Medal (Third Class)

Mrs. Amar Das, Medical charge of the Indian Army Maternity and Child Welfare Centre, Delhi Cantonments.

Miss Sigrid Johnson, Nurse, Clough Memorial Hospital, Ongole, Guntur, Madras.

Babu Sanat Kumar Chowdhury, Sub-Assistant Surgeon, Sadar Hospital, Bogra, Bengal.

Mr. Bimal Ranjan Dey, Sub-Assistant Surgeon, attached to the Staff of H. E. the Governor of Assam.

Sardar Bahadur

Sardar Salub Sardar Amrik Singh, Civil Surgeon (Retired), Gujranwala, Punjab.

Rai Bahadur

Mr. Kedar Nath Goyal, Civil Surgeon, Bulandshahr, U. P.

Rai Sahib Lekhraj Singh, Medical Officer in charge, Sadar Hospital, Kheri, U. P.

Mr. Ram Narain Sindhi, Civil Surgeon, Montgomery, Punjab.

Dr. Phanindra Nath Ghose, Vice-Chairman, Municipal Board, Dibrugarh, Assam.

Rao Bahadur

Mr. Calambur Ramamurti, Professor of Bacteriology (Retired), Medical College, Vizagapatam, Madras.

Mr. Ganpat Ramrao Goverdhan, Civil Surgeon (Retired), C. P. and Berar.

Vaidyaratna

Mr. Sukhramdas Tejbhandas Ojha, Ayurvedic Medical Practitioner, Sind.

Kaviraj Balukeswar Acharya Visagratna, Head Pandit, Adarsha Ayurveda Vidyalaya, Cuttack.

Khan Sahib

Saiyid Nisar Ahmed, Medical Officer in charge, Police Hospital, Moradabad, U. P.

Mr. Mohamed Yacoob Beg, Railway Assistant Surgeon, Burma Railways, Rangoon.

Rai Sahib

Mr. Bhawani Shanker Yajnik, Superintendent, Government Vaccine Depot, Patwadangar, Naini Tal District, U. P.

Lala Dharam Pal Gupta, Medical Officer in charge, Najibabad Dispensary, Bijnor District, U. P.

Babu Sushilananda Sen, Civil Surgeon (officiating), Purnea, Bihar.

Babu Sajani Kumar Chatterji, Officer in charge, Bacteriophage Laboratory, Patna.

Subedar Bashi Ram, Sub-Assistant Surgeon, Civil Hospital, Loralai, Baluchistan.

Mr. Jiwan Ram Maleri, Chief Medical Officer, Nabha State.

Mr. Santosh Kumar Barat, Assistant Surgeon, G. I. P. Railway, Jubbulpore, C. P.

Rao Sahib

Mr. Chella Suryanarayana Murti, District Veterinary Officer, Madras.

Mr. Dharmapuri Govindarajulu Nayudu, Medical Practitioner, Bezwada, Madras.

Mr. Baldeo Singh Chaudhuri, Superintendent, Civil Veterinary Department, Jullundur Division, Ferozepore, Punjab.

Current Topics

Mandelic Acid Therapy

By MEREDITH F. CAMPBELL, M.D.

(From the *New York State Journal of Medicine*, Vol. XXXVIII, 1st October, 1938, p. 1257)

DESPITE progressive improvement in medicinal anti-sepsis of the urinary system, the search is still on for a bacteriocidal agent which will be regularly satisfactory in the combat of the usual non-tuberculous urinary tract infections. During the past three years notable advances have been made in this field by the introduction of mandelic acid compounds and, most recently, para-aminobenzene sulfonamide, known commercially as sulphanilamide or prontosil. Each of these medications will produce clinical results in urinary infections which are strikingly superior to any heretofore obtainable by oral chemotherapy. The employment of the sulphanilamide compounds is perhaps the more fascinating because the *modus operandi* is unknown but my brief presentation here will be concerned only with the assigned subject—mandelic acid therapy.

Mandelic acid therapy is the illustrious direct descendant of the ketogenic dietary treatment of urinary infection. The discovery and application of the therapeutic mechanism common to each is historically interesting. In 1931 Helmholtz noted that the urine of an epileptic child in therapeutic ketosis (ketogenic diet) failed to show bacterial clouding after standing for a week in a warm room. Investigation disclosed the bacteriocidal property of ketone urine when the hydrogen ion concentration (pH) is less than 5.5. Fuller discovered the important acidifying factor in ketone urine is *lævo*-rotatory betaoxybutyric acid and when the concentration of the last is 0.5 per cent or greater and the pH level is below 5.5, the urine is not only bacteriostatic but commonly bacteriocidal.

During an investigation to obtain an organic acid which would be excreted in the urine and the action of which would be like that of β -hydroxybutyric acid, Rosenheim hit upon mandelic acid. He was the first to employ mandelic acid clinically—and with notable success. Mandelic acid is a pure white crystalline hydroxyacid represented by the chemical formula $C_6H_5CH(OH).COOH$. Following ingestion it is excreted unaltered in the urine. Like β -hydroxybutyric acid, mandelic acid is bacteriocidal in the urine only in a concentration of 0.5 per cent or greater and when the urinary acidity is pH. 5.5 or greater. In most instances of failure to sterilize the urine by mandelic acid therapy, it will be found that the conditions just mentioned have not been fulfilled. The concentration may be inadequate because of (1) inadequate dosage or (2) renal failure to excrete. Mandelic acid in large doses is a renal irritant, which may account in some instances for a lowered output of the acid or the kidneys may already be impaired when the medication is given. An inadequate urinary acidity is a frequent cause of failure but as a rule is readily rectified by the auxiliary administration of a strong acidulant such as ammonium chloride, calcium chloride or ammonium nitrate. Failure to keep the urine sufficiently acid through neglect of a constant check on the urinary pH. is doubtless a commoner cause of failure than inadequate mandelic acid excretion. Attention will again be directed to these factors for without their close observance, failure is almost certain to replace possible success with the method.

Indications for mandelic acid therapy.—Mandelic acid is indicated in the treatment of the usual non-tuberculous infections of the urinary tract. It has been ineffectual against tuberculous invasions; I have found no record of its use in the rare infestations such as bilharziasis, actinomycosis, etc.

During the therapeutic period the urine must be carefully and periodically checked for evidence of renal irritation (albumin, occasionally blood, casts) and if

this is disconcerting, the medication must be discontinued. Yet it must not be stopped because of a faint trace of albumin or a relatively few scattered casts.

The pH. should be determined twice daily so that sufficient acidulant may be given to keep the reaction below pH. 5.5. Adults can be taught to control the last factor themselves and will report any unusual developments while taking the medication. The two indicators most commonly used now to determine an acidity greater than pH. 5.5 are methyl red and nitrazine. Methyl red is red on the acid side of pH. 5.5 and yellow on the alkaline side. This is used either as a methyl red test paper or as a solution, a few drops of which are added to the urine to be tested. I regularly employ nitrazine paper or nitrazine solution (Squibb) as this enables one to make a rapid approximation of the urinary pH. Nitrazine (sodium dinitrophenylazo-naphthol disulphonate) is sensitive to N/10,000 acid or alkali; its colour is yellow at pH. 5.0, mustard at pH. 5, olive at pH. 6, grey-blue at pH. 7, and blue at pH. 8. A colour chart with pH. 0.5 gradations enables one to estimate the urine titre with rapidity and an accuracy adequate for clinical application. A potentiometer gives the most correct estimation of the pH. but its use is more desirable than essential.

Children develop acidosis readily and it is therefore usually wise to start them with a slightly less than average dose, and when mandelic acid therapy is employed in infants, the physician must be keenly alert to any unfavourable reaction—especially acidosis. Yet this does not contra-indicate its use in the very young; I regularly employ it in children of all ages—the youngest to date was ten weeks old.

Contra-indications.—Because mandelic acid is excreted unaltered in the urine and is a potent renal irritant, its employment is contra-indicated when the renal function is impaired as evidenced by a phenol-sulphonphthalein test, specific gravity fixation, etc. This irritant action is of special importance in patients whose impaired kidneys are still further injured by the acid and whose function may be alarmingly reduced. In such cases, not only is the urinary excretion lessened, but the mandelic acid continually ingested is retained in the body to produce acidosis. This course is often more rapid and severe when a strong acidulant such as ammonium chloride or calcium chloride is co-administered. A tender age is no contra-indication (*cf. supra*) to the employment of mandelic acid therapy and it may be freely administered to elderly patients whose kidneys are relatively unimpaired.

Medication and dose.—Mandelic acid was first administered as a sodium salt (sodium mandelate) compounded of mandelic acid and sodium bicarbonate. Ammonium mandelate induces a greater urinary acidity and is the compound now most generally employed although other mandelate salts such as ethanalamine mandelate have more recently been introduced. Ammonium mandelate is extremely salty and disagreeable to take, hence it is usually given as an elixir or a syrup yet I have fewer complaints when it is taken as a tablet (0.5 gm. each for adults; 0.25 gm. each for children). Ingestion of the medication is sometimes made more acceptable by the addition of liquorice or chocolate flavouring.

The dose of ammonium mandelate that I employ in children ranges from 2 gm. per day in young infants to 10 gm. a day at twelve years and given in divided doses three or four times a day, preferably after meals and just before retirement. Infants less than six months of age are given 2 gm. in twenty-four hours, children six to twenty-four months old may be given 2 to 4 gm., patients two to four years are given 4 to 6 gm., and from five to twelve years, 6 to 10 gm. are given. Ammonium chloride is given in addition in sufficient amount to render the urine more acid than pH. 5.5. Usually 2 or 3 gm. (30 to 45 gr.) daily is sufficient in children but I have employed doses ranging from 0.7 gm. (10 gr.) to 6.7 gm. (100 gr.) per day. In any event, sufficient acidulant must be given to attain a urinary acidity of less than pH 5.5.

In adults the dose of ammonium mandelate is correspondingly greater than in children, 9 to 14 gm. (135 to 210 gr.) with an average of 12 gm. being given together with the necessary amount of acidulant to make the urinary acidity pH 5.5 or less. As a rule, this means beginning with 3 to 5 gm. (45 to 75 gr.) per day and varying the intake to meet the pH requisite.

Were the precaution more regularly observed, it would be unnecessary to direct attention to the fact that all alkalinizing agents such as sodium bicarbonate, magnesium hydroxide, citrus fruits, etc., must be avoided while one is attempting to achieve the urinary acidity requisite to successful mandelic acid therapy.

During the therapeutic period the fluid intake is reduced to 1,200 to 1,400 c.c. per day in an adult. One must be extremely careful about reducing the fluid intake of any child and I, therefore, say nothing to the mother about altering this factor nor is the daily intake comparably reduced in my young hospitalized patients.

A daily or, better, a twice daily check of the urine titre is essential during the period of treatment with mandelic acid. These repeated studies guide one in the medicinal maintenance of the requisite acidity. They disclose evidence of renal irritation consequent to the medication and, extremely important, reveal clinical progress as indicated by diminution of bacteria and inflammatory products in the urine.

This therapy is usually effective in forty-eight to seventy-two hours, at least striking improvements will be noted in that time, and the treatment should be continued. If the urine cannot be sterilized (as evidenced by two negative cultures of catheterized specimens) in two weeks, the treatment should be discontinued for a week or ten days and then intensively resumed or a change to prontosil, for example, may be made. If a second effort fails and the therapeutic requisites have been met, it is unlikely that further effort will be successful—at least until previously unrecognized associated etiologic factors such as obstruction, primary focal infection elsewhere, etc., are eliminated. If none of these factors can be proved to exist, change antiseptics.

A word is in order concerning the collection of specimens in the study and treatment of urinary infections. Bacteriologic study implies the aseptic collection of specimens. For this reason all females must be catheterized, even the youngest infants. With proper technique and by using only a soft rubber catheter which requires introduction under visualization, catheterization can be performed without injury in a female of any age. Once the catheter is introduced, a few c.c. of urine should be permitted to flow out before specimen collection is begun, to carry away any debris which may have entered the catheter eye.

Clinical evaluation based on microscopic and bacteriologic examinations of voided specimens are misleading in females, no matter how vigorously the vestibule, introitus, labia, urethral orifice, etc., have been cleaned. Pus cells, epithelial debris and bacteria washed into the specimen during urination interfere with an accurate conception of these elements in the bladder urine. Repeatedly the writer has been asked to perform complete urologic examination in girls said to have 'chronic pyelitis', the diagnosis being based on studies of voided specimens laden with pus cells, but in whom vesical catheterization has shown normal sterile urine.

In the male the specimen can be satisfactorily obtained when the prepuce is well retracted behind the glans, the glans and meatus are thoroughly cleansed with an antiseptic solution such as oxycyanide or bichloride of mercury 1:500, and the patient passes a few c.c. before the voided specimen is collected in a sterile receptacle. If this cannot be properly carried out, the male also should be catheterized. The culture tube should be implanted with at least 0.5 and preferably 1 c.c. of the urine.

TEST OF CURE

The patient should not be discharged cured until two negative cultures of properly collected specimens have been obtained. Although most sterile urine is pus-free at the termination of a non-tuberculous urinary infection, there may be scattered leukocytes in urine repeatedly sterile to culture. In other words, the bacteriologic culture rather than the absence of leukocytes is the all important criterion of successful treatment. If this test of cure is observed the incidence of 'recurrence' of urinary infection will be extremely low. Most clinical episodes commonly designated as recurrences of 'pyelitis' are merely exacerbations of a smouldering asymptomatic and previously unrecognized or inadequately treated urinary infection. The exacerbation may have been induced by urinary obstruction, severe constipation, the acquisition of a focal infection elsewhere, or any of the usual predisposing etiologic factors in urinary infections. A plea is therefore made for correct (aseptic) collection of urine specimens when urinary infection is under study and treatment and also for at least two negative urine cultures as the test of cure.

REACTIONS

Cook reported nausea and vomiting in less than 1 per cent of patients receiving mandelic acid therapy at the Mayo Clinic and only 10 per cent developed a mild diarrhoea. My observations suggest that in general usage the incidence of such reactions is probably much higher. Yet there is no urinary antiseptic which may not provoke distressing enteric or vesical reactions—witness hexamine (urotropine), caprokol, acriflavine, pyridium, prontosil, *ad infinitum*. The irritant effect of mandelic acid on the kidney has been discussed. Hematuria may develop but is unusual.

The results are most gratifying in the usual bacillary infections. Experimentally, Helmholz found that *in vitro* mandelic acid is most effective against *Escherichia coli* and *Proteus ammoniae*, and less effective against *Salmonella*, *Aerobacter*, and *Pseudomonas*. The last two organisms are most resistant of the common bacilli. It is known to be least effective against the Gram-positive cocci, notably *Streptococci* and *Staphylococci*. Still with rigid clinical control these infections may sometimes be eradicated. Moreover, *Streptococcus fecalis* has been found almost as vulnerable to the treatment as *B. coli*.

Published results of mandelic acid therapy suggest that with mutual diligence of the patient and physician, at least three-fourths of patients with uncomplicated urinary infection can be cured. Rosenheim cured 71 per cent of eighty-eight patients. Of thirty-seven failures, twenty-one had urinary stasis or obstruction; two could not be satisfactorily acidified. Carroll Lewis and Kapel reported fifty cases of urinary infection treated by mandelic acid. Of thirty-seven *B. coli* infections, twenty-seven were sterilized. But one of six cases of *B. proteus* was cured; none of the *Staphylococcus* infections were cured. Yet in a series of seventy-five patients reported by Cook and Buchtel managed with special care, the urine was sterilized in sixty-one cases or 81 per cent. In forty-one adults thus treated by the writer, twenty-two (54 per cent) were cured as evidenced by two negative cultures of aseptically collected specimens. The uncured patients nearly all suffered from prostatitis, or had poor renal function. In thirty-four children, I achieved success in twenty-six or 76.4 per cent.

Mandelic acid escapes being the perfect urinary antiseptic by (1) being active only in a highly acid urine, (2) producing reactions in the alimentary tract and (3) having its efficiency severely influenced by the renal function. Moreover, it may provoke renal irritation.

The causes of failure in mandelic acid therapy may be briefly summarized as follows:—

- (a) Failure of patient to co-operate.
- (b) Inadequate dosage; in mandelic acid therapy homeopathic doses are doomed to failure.
- (c) Inadequate acidification; this is readily corrected.
- (d) Poor renal function: this may be due to

hydronephrosis, Bright's disease, chronic pyelonephritis, polycystic kidney, etc. Poor renal function may greatly reduce the quantitative output and excreted concentration of mandelic acid. The excretion of the necessary acidulant (e.g., ammonium chloride) is correspondingly diminished.

(e) Unusual virulence of the invading organisms.

(f) Residual urine, whether due to obstruction, neuromuscular inertia, or atony consequent to long-standing infection, may render bacteriologic cure difficult or require eradication of the residuum before the antiseptic can become effective. Stone, tumour or foreign bodies in the urinary tract may likewise prevent urinary sterilization. Chronic prostatitis, by continually pouring infection into the posterior urethra, may keep the urine from being sterilized or may reinfect when cure apparently has been achieved.

(g) Inadequate period of treatment: the medication should be given a trial of not less than one week and preferably ten days, unless individual idiosyncrasy prohibits.

SUMMARY

Although the ideal urinary antiseptic is yet to be obtained, mandelic acid therapy marks a notable advance in this important chemical field. This treatment can be employed in most patients with the usual non-tuberculous bacillary urinary infections, yet it has definite limitations as discussed under contra-indications and also causes of failure. By close observance of the indications, contra-indications, and technique as herein outlined, mandelic acid therapy may be expected to be successful in three out of four cases.

Reviews

THE MEDICAL ANNUAL: A YEAR BOOK OF TREATMENT AND PRACTITIONER'S INDEX.—

Edited by H. L. Tidy, M.A., M.D., F.R.C.P., and A. R. Short, M.D., B.S., B.Sc., F.R.C.S. Fifty-seventh Year. 1939. John Wright and Sons, Limited, Bristol. Pp. lvi plus 660. Illustrated. Price, 20s.

The greatest problem that the publishers of this excellent book must face each year is keeping the size of the volume within reasonable bounds. It has now reached the maximum size that ordinary binding and the wrists of readers will stand, and for some years the publishers have wisely refused to go beyond this limit; in fact this year they have been able to spare a few pages. Nevertheless, the individual articles do not show any signs of undue compression.

Sulphanilamide has a course permeated into every corner of medical practice during the year, so much so that it is refreshing to be able to read any article in which its success or failure is not the main theme. A good summary of the important advances in this form of therapy is given under 'chemotherapy of bacterial diseases'.

With the advance of so-called civilization new cures come along, but also new diseases. We do not refer only to the toxic effects of the cures themselves, when these are powerful drugs, but to such things as traffic lights and pneumatic drills and rivetters. It is a matter of surprise that pneumatic drills, which must precipitate psychoses amongst many people whose office or house is in the neighbourhood of the road menders', or spoilers', operations, cause very little morbid changes in those who operate them—unless of course they happen to strike a high-powered electric cable. There is in this volume a good summary of an interesting and important paper in the *Journal of the American Medical Association* on the neurological effects of traffic lights on the motor-car driver. Whilst designed to obviate collisions between cars, traffic lights cause repeated 'collision', in the Pavlov sense, within the central nervous system of the driver. Pavlov showed that the quick succession of excitatory and inhibitory reflexes produced a state of nervousness in the dog; this American writer considers the stimuli producing such reflexes have their counterparts in the green and the red lights. The interposition of the yellow light—which is not usual in the United States—must help to alleviate this collision of reflexes, but the 'Schubert' type of traffic light, in which there is an indicator that warns you how much longer each light will last will obviously reduce this collision considerably and seems to have few disadvantages, though it would not be applicable to the hand-operated lights.

The nomenclature of disease is large enough and one naturally hesitates to add to it, but certain facts have to be faced. Technical words, despite the popular idea that they are invented to confuse the layman, are

introduced to facilitate communication between experts, as by the use of a single word it is usually possible to convey an idea that would otherwise necessitate many words. Diseases undergo changes, and further our knowledge of diseased states increases, so that a disease syndrome which at the time appeared to be specific is later found to include more than one pathological state. The word *pneumonitis* which has recently been introduced describes a condition which is distinct pathologically, radiologically, and clinically from pneumonia; it is better to introduce a new word than to continue to refer to it as a mild or atypical pneumonia, or an unresolved pneumonic patch. This matter is discussed at some length.

Another subject that is selected for special discussion is the sedimentation rate. This simple procedure has been carried out, during the last twenty years, in a very large number of individuals suffering from various diseases, and extravagant claims have been made for it as a diagnostic and prognostic method. The time has come to take stock of all this work and this has been done concisely but thoroughly by Dr. P. N. Panton. Its diagnostic value can be ignored as it is increased in so many diverse pathological states but as a prognostic procedure in certain diseases 'in which it is otherwise difficult to find a mathematical measure of change', it is useful; tuberculosis and leprosy are examples of such diseases.

Tropical diseases have been dealt with by Dr. P. Manson-Bahr and are on the whole done well, but one is a little surprised to find under the heading 'malaria' that the Ascoli method of treatment and the inevitable prontosil are the only two subjects chosen for mention; for the latter only one paper is referred to.

The term 'lymphogranuloma inguinale' is retained, but the general tendency at present is to drop this term, as the condition is anything but a granuloma; 'lymphopathia venereum' is a much more satisfactory term.

Nutrition and diet have been given the special attention they deserve.

Drs. Stanley Davidson and H. W. Fullerton have written most of the sections on blood diseases and anæmia, including tropical macrocytic anæmia and have given even balanced accounts of recent work.

There are an unusually large number of plates, skiagrams, black and white illustrations of technique of superficial lesions, and of pathological specimens, and coloured plates of skin diseases.

The great value of the *Medical Annual* is that it forms a permanent addition to one's library and, if one looks up what has been said on any particular subject during the past few years, one gains a very complete and up-to-date conception of that subject.

The year's volume is well up to the usual standard.

FRACTURES AND DISLOCATIONS IN GENERAL PRACTICE.—By John Hosford, M.S. (Lond.), F.R.C.S. (Eng.). 1939. H. K. Lewis and Company, Limited, London. Pp. viii plus 274, with 71 illustrations. Price, 12s. 6d.

This book, which is a recent addition to the 'General Practice' series published by H. K. Lewis and Co., should prove popular as it provides, within a small compass, a reliable account of all the common fractures and dislocations.

The first part of the book discusses general principles, and separate chapters are devoted to important subjects such as the use of plaster, continuous traction, complications of fractures, and so on. To emphasize the importance of combining rigid immobilization of a fracture with active use of the rest of the limb, Mr. Hosford quotes the case of a patient who, 'With a fracture of the tibia and fibula immobilized in plaster from the toes to the tubercle of the tibia drove a car 200 miles as well as spending an active holiday on the Broads, twice falling into the water. Such activities', he continues, 'Are encouraged....'

When skeletal traction is required the author prefers to use a Steinmann's pin rather than a Kirschner wire. It would certainly seem that the Steinmann's pin has been returning to favour during the last four years, possibly due to the influence of Böhler.

The second part of the book deals with the common fractures and dislocations systematically. If any part deserves special mention it is the modest section on fractures of the os calcis, a condensation of a previous publication of the author. The final diagnosis of these fractures depends upon the x-ray findings, and a special oblique view in addition to a lateral view is advised. Böhler's method of reduction is described.

An appendix containing short biographies of Pott, Colles, Smith, Thomas, and Bennett forms an interesting conclusion to this admirable little book.

W. McN. N.

A MANUAL OF FRACTURES AND DISLOCATIONS.—By B. B. Stimson, A.B., M.D., Med. Sc.D., F.A.C.S. 1939. Henry Kimpton, London. Pp. 214. Illustrated with 95 engravings. Price, 12s. 6d.

This manual is intended primarily for medical students, and the authoress has therefore limited herself to a brief outline of the diagnosis and treatment of fractures and dislocations.

In the first part entitled 'General Considerations' the student will find much that is useful and interesting. For a thorough classification of fractures or a description of delayed union, to mention only two subjects, he will have to refer elsewhere.

The remaining three parts of the book describe in turn fractures and dislocations of the upper extremity, the trunk, and the lower extremity. A few x-ray photographs to supplement the numerous line drawings would be an improvement; they might well displace the tables of percentages of occurrences (sometimes carried to three places of decimals) to which the average student will pay no attention.

After the reduction of a Colles' fracture it is stated that the wrist should be placed in palmar flexion and ulnar deviation to maintain the reduction. We cannot agree with this at all.

Lorenz Böhler is responsible for very many advances in the principles and technique of treatment of fractures, but no mention of his work is to be found in this book.

W. McN. N.

INFECTIONS OF THE HAND: A GUIDE TO THE SURGICAL TREATMENT OF ACUTE AND CHRONIC SUPPURATIVE PROCESSES IN THE FINGERS, HAND AND FOREARM.—By A. B. Kanavel, M.D., Sc.D. Seventh Edition. 1939. Baillière, Tindall and Cox, London. Pp. 503. Illustrated with 229 engravings, many in colour. Price, 30s.

Our knowledge of the ætiology and principles of treatment of infections of the hand owes much to

Kanavel whose work, begun over twenty-five years ago, is embodied in this well-known monograph, now in its seventh edition.

The applied anatomy of the hand has, as in previous editions, been given special prominence, and here is to be found the original description of those major fascial spaces which are now often called Kanavel's spaces.

The recognition and treatment of tenosynovitis is discussed at greater length, and a section has been added describing the use of splints for the after-treatment of infections of the hand.

The sulfanilamide drugs receive only brief mention on the grounds that they have not yet had a thorough try-out.

Throughout the book the clarity of the text and beauty of the illustrations are remarkable; and it is hoped that although Kanavel died last year, the work of revision for future editions will be taken up by his collaborators.

W. McN. N.

THE COMMON DISEASES OF THE SKIN: A HANDBOOK FOR STUDENTS AND MEDICAL PRACTITIONERS.—By R. Cranston Low, M.D., F.R.C.P.E., F.R.S.E. Third Edition. 1939. Oliver and Boyd, Edinburgh. Pp. xiv plus 319, with 148 illustrations (8 of which are in colour). Price, 10s. 6d.

This is one of a number of very short books on skin diseases that are available in the English language. It is stated in the preface to be based on the lectures of the author and reading it gives the impression that it must be very largely in the actual words of these lectures.

One of the reasons for the brevity of this book is the fact that syphilis has been omitted as this is well dealt with in books on general medicine, and in any case now that the Wassermann reaction can be done almost anywhere the diagnosis of syphilitic skin lesions practically never rests on clinical appearances alone, so we are inclined to agree with this omission.

Practically no references are given to other workers so the book is the expression of the personal opinions of one dermatologist, with all of which others will not be in entire agreement.

The need for expansion is evidenced because the first edition which appeared in 1927 occupied 219 pages whereas the present one is 315 pages, and there are many more illustrations.

It is a useful handbook for the general practitioner, but as indicated above it is limited to the views of a single dermatologist, and despite the fact he is a very experienced one, it rather lessens the appeal of the book.

P. A. M.

RECENT ADVANCES IN FORENSIC MEDICINE.—By S. Smith, M.D., F.R.C.P., D.P.H., and John Glaister, M.D., D.Sc., J.P. Second Edition. 1939. J. and A. Churchill, Limited, London. Pp. viii plus 264, with 85 illustrations. Price, 15s.

FORENSIC medicine offers a vast field for the writer and it must have been difficult to decide on the scope of this book, but the choice of subjects seems to be a very satisfactory one. It would be difficult to find a better description of the theories or of the technique of blood grouping, and the discussion on the medico-legal application in cases of questioned paternity is a well-balanced summary of the accepted scientific point of view; in this matter the law is being a little obtuse at present, though there are signs of improvement, and the new bill that is being introduced should clarify many points of law. The general opinion is that non-conformity of types based on Bernstein's theory is absolute proof of non-paternity, and that that based on von Dungern and Herszfeld's, beyond the point where this coincides with Bernstein's, is very strong evidence of non-paternity. There are apparently one or two 'authentic' exceptions to the inheritance of blood groups according to the latter theory, but who is to say what is an authentic exception? This depends on whether you take the 'Cæsar's wife' point of view or

are the sort of person who insists on the bishop's Wassermann test being done.

The chapter on the medico-legal examination of hair is a fascinating one and opens up great possibilities, though it will not fall to every doctor's lot to have to identify the hair of an aye aye (whatever it is), of an Arabian baboon, or of a Diana monkey, nor to say whether a particular specimen is a female pubic hair, or from a moustache, but, should he be called upon to do so, the reviewer knows no other collected source of such information.

The chapter on testing alcohol in the blood is also an important one. Purves Stewart's table for the correlation of the alcohol in the blood and the clinical examination is given. 'Not drunk is he who from the floor can rise and drink and ask for more' (200 mgm. or less of alcohol per 100 c.cm. of blood). 'but drunk is he who prostrate lies without the power to drink or rise' (350 mgm. per 100 c.cm.). This is not, however, the view that the magistrate of to-day takes.

The book is a very valuable contribution to the subject, a worthy member of this excellent series of recent advances.

SPINAL ANÆSTHESIA.—By Louis H. Maxson, A.B., M.D. 1938. J. B. Lippincott Company, Philadelphia and London. Pp. xxii plus 409, with 69 illustrations. Price, 30s. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 20

MR. MAXSON'S *Spinal Anæsthesia* is a welcome addition to the very few books that are entirely devoted to this subject.

Since the impetus given to spinal anæsthesia during recent times by George Pitkin of New Jersey a vast amount of work on the subject has been done and the literature of the last decade is so extensive that the author has done a real service by embodying in his work everything that is essential.

The subject-matter throughout the book has been dealt with in detail with due regard to brevity consistent with clarity and in a style quite impressive. Mindful of the fact that a clear conception of the anatomical, physiological and physical factors in spinal anæsthesia is so essential for the production of uniformly satisfactory and safe anæsthesia these aspects have been thoroughly discussed. The chapters dealing with difficulties, dangers, mortality, advantages, disadvantages, indications and contra-indications have been presented in a manner free from bias—a tendency from which few writers on spinal anæsthesia are immune. Opinions of well-known authorities on the subject have been freely quoted and controversial matters have been discussed from every point of view. The few diagrams and charts are well chosen and instructive.

On the whole it is a comprehensive and up-to-date work on spinal anæsthesia which will prove immensely useful to the student, the anæsthetist and the surgeon alike.

M. C. G.

RADIATION THERAPY: ITS USE IN THE TREATMENT OF BENIGN AND MALIGNANT CONDITIONS.—By Ira I. Kaplan, B.Sc., M.D. 1937. Oxford University Press, London and New York. Pp. xxviii plus 558. Illustrated. Price, 30s. Obtainable from Oxford University Press, Bombay and Calcutta

DR. IRA KAPLAN'S new book on radiation therapy is a comprehensive and practical book on the therapeutic uses of x-rays and radium. The author is well qualified for the important task he has undertaken for, in addition to being director of some of the most important radiotherapeutic clinics in New York, he is also editor of the therapeutic section of the *Year Book of Radiology*.

The book deals with radiation therapy as employed in the treatment of benign as well as malignant diseases. It is based on the author's experience in treating patients in both special cancer and general hospitals, as well as in private practice. It aims at giving the student, the general practitioner, as well as

the specialist, an understanding of the fundamentals of irradiation, and enumerates the conditions for which this form of therapy is of value.

It is perhaps surprising to some of us to see the long list of benign conditions which are amenable to radiation treatment. Diseases as widely separated as erysipelas, carbuncle and asthma respond favourably.

The book covers a wide range of subjects including the whole field of radiation therapy by radium and x-rays. If one were to offer criticism it is that the descriptions of the technique employed is in many instances too vague to be of real value to the worker. The dose of radium too is expressed in milligramme hours—a method which is open to objection.

As pointed out by another reviewer, there are a number of typographical errors which can be avoided.

We hope these defects will be remedied in a new edition.

J. A. S.

CLINICAL ELECTRO-SURGERY.—By G. M. Blech, G.C.S., G.C.G., M.D., LL.D. With Chapters by H. A. Colwell, M.B., Ph.D., M.R.C.P., and B. W. Windoyor, M.B., B.S., F.R.C.S., D.M.R.E. 1938. Oxford University Press, London and New York. Pp. xxvii plus 389. Illustrated. Price, 21s. Obtainable from Oxford University Press, Bombay and Calcutta

DR. BLECH, with the object of acquainting practitioners with the scope and limitations of electro-surgery, has produced a most useful and interesting book.

While reminding us that this branch of surgery has to some extent lost ground through the errors of over-enthusiastic or ignorant users, he puts forward its just claims in such a reasonable manner as to inspire confidence in his recommendations.

The physics of high frequency currents is not described, but an adequate glossary of technical terms is provided, and a chapter on the historical development of electro-surgery serves as an introduction to a section devoted to general principles of technique, equipment, and so on.

The second section describes electro-surgical operations on the various parts of the body. Special emphasis is laid on the rule that electrotomy is the only permissible method of incision in relation to a recognized or suspected malignant tumour.

It is not clear why a chapter on the radiotherapy of neoplasms has been contributed by the author's British colleagues, Drs. Colwell and Windoyor. But it is well written and maintains the high standard set by the rest of the book.

THE MEDICAL APPLICATIONS OF THE SHORT WAVE CURRENT.—By W. Bierman, M.D. Including a Discussion of its Physical and Technical Aspects. By M. M. Schwarzschild, M.A. 1938. Baillière, Tindall and Cox, London. Pp. xvii plus 379. Illustrated. Price, 22s. 6d.

DR. BIERMAN'S book presents a practical consideration of the therapeutical effects of the application of the short wave current. This includes consideration of the physical character of the current. Its influence on the living human body in the normal and diseased state. An understanding of the pathologic processes which we hope to effect by its aid.

As a scientific work it has the advantage of being both practical and well balanced. The early chapters are devoted to the history, physics, and physiology of the subject. This part of the work has been mainly written by Dr. Schwarzschild, a well-known authority on this subject. The following chapters on technique and clinical application are well worthy of study by anyone interested in the subject. The technique is carefully described with many illustrations which should be a considerable help to the practitioner. Clinical applications are discussed at length and the results of other workers are also discussed.

There is an excellent index so that it is possible for the busy practitioner to look up the disease in which he is interested, the applicability of this form of

therapy, and the technique of application, readily and without wading through irrelevant matter.

There are of course faults inseparable from the treatment of this kind of subject. In some places the discussions tend towards verbosity and the reader is left involved in a plethora of information from which it is difficult to draw any positive conclusion. On the whole, however, the impression given by this book is that it provides a sound working guide to the employment of short wave therapy in general practice. The book combines the merits of an intelligible presentation of the scientific and medical aspects of this treatment with an annotated catalogue of world-wide experiences in the treatment of a large number of diseases.

J. A. S.

PRINCIPLES OF MEDICAL STATISTICS.—By A. Bradford Hill, D.Sc., Ph.D. Second Edition. 1939. Published by The Lancet Limited (7, Adam Street, Adelphi), London. Pp. vii plus 189. Illustrated. Price, 6s.

It is about 18 months since we drew attention to the first edition of this valuable book in an editorial note on medical statistics. We particularly commended it to would-be contributors to this journal, and there has been some evidence during the last year that our advice was not unheeded.

The book has obviously been a great success; there is little change in this new edition, as little improvement was possible. The author says that he has endeavoured to clarify certain points which appeared to confuse readers of the first edition, and he has added a chapter in which the usual methods of calculating standardized death rates are illustrated and discussed in detail.

We can only repeat what we said about the first edition; it is a book for which there was an obvious demand and it supplies that demand in the best possible manner.

FUNDAMENTALS OF PHYSICAL EXAMINATION.—

By G. G. Deaver, M.D., B.P.E. 1939. W. B. Saunders Company, Philadelphia and London. Pp. 299. With 126 illustrations. Price, 12s. 6d.

THE purpose of the book is to provide physical educators, students, public health and school nurses with a manual that will aid them in recognizing the early manifestations of abnormal functioning of the body and in understanding the technique and medical nomenclature of the physician.

The different chapters deal with how the medical history has to be taken, and the physical examination of the different systems and the different tests of efficiency of vision, hearing, muscular power, etc., have to be carried out. Besides containing the actual methods of conducting an examination, each chapter contains 'Lessons to be written', 'Laboratory work' and a 'Self test', three outstanding aids that have long proved valuable media for effective teaching.

The book is well written and gives the information necessary for the recognition of early symptoms and signs of bodily disease and the detection of bodily deformity. It should prove useful to those for whom it is written.

P. C. S. G.

A DICTIONARY OF SCIENTIFIC TERMS: PRONUNCIATION, DERIVATION, AND DEFINITION OF TERMS IN BIOLOGY, BOTANY, ZOOLOGY, ANATOMY, CYTOLOGY, EMBRYOLOGY, PHYSIOLOGY.—By I. F. Henderson, M.A., and W. D. Henderson, M.A., B.Sc., Ph.D., F.R.S.E. Third Edition. Revised by J. H. Kenneth, M.A., Ph.D., F.R.S.E. 1939. Oliver and Boyd, Limited, Tweeddale Court, Edinburgh. Pp. xii plus 383. Price, 16s.

THE scope of this specialized dictionary may be adequately described by the following sentence taken from the preface. The subjects selected for treatment are Biology and its allies, Anatomy, Botany, Zoology, Embryology, Cytology, Physiology; some terms in Bacteriology and Palaeontology are included.

It is more than a bare list of definitions because the roots of each word are given, and this makes it much more valuable as it enables the student to acquire an intelligent conception of the real meanings of the words, and on this account to remember them more easily.

This is a book that students of any of the above subjects would be well advised to have constantly within easy reach on their desks, because in it will be found many terms that are not in an ordinary dictionary and a large dictionary or encyclopædia is unsuitable for this purpose on the grounds of bulk and the fact that they are too expensive for the average student.

MEDICAL ORGANIZATION AND SURGICAL PRACTICE IN AIR RAIDS.—By P. H. Mitchiner, C.B.E., T.D., M.D., M.S., F.R.C.S., and E. M. Cowell, D.S.O., T.D., M.D., B.S., F.R.C.S. 1939. J. and A. Churchill, Limited, London. Pp. viii plus 247, with 50 illustrations, including 1 coloured plate. Price, 10s. 6d.

WITH war-clouds hanging over Europe, almost every government is busy with organization of anti-air-raid precautions and measures for medical relief of victims of future air raids. The authors are to be congratulated on this timely publication dealing with organization of medical relief and surgical practice in air raids. Both Mr. Mitchiner and Colonel Cowell had considerable experience of surgery during the Great War, and Colonel Cowell went to Spain in December 1938 to acquire first-hand information on modern air raid casualties. The members of the medical profession 'who have fortunately been spared the experience of war', have the benefit of the accumulated experience of the authors in this valuable book.

The details of organization and administration of different units in medical relief, namely first-aid parties, dressing stations, casualty clearing hospitals, base hospitals, etc., have been dealt with in one chapter. These are based on the scheme as envisaged by the British Ministry of Health. The chapter on air attack, its methods and the effects of aerial bombardment, and the methods of protection from air attack make particularly interesting reading. The authors have dealt with the treatment of different types of wounds and their complications briefly, stressing the difference in technique that exists between civil and air raid practice. The various injuries that may be inflicted on different parts of the body during air raids have been adequately dealt with.

There are numerous excellent illustrations showing the various types of injury caused during air raids, and their treatment. A photograph of spreading cutaneous gas gangrene starting in an infected appendectomy wound, however, does not fall into the category of injury (or its complications) caused by air raids.

A chapter has been devoted to organization of nursing, and appendices deal with first aid and transport, chemical warfare, details of equipment of mobile surgical units and x-ray units.

The book will be found valuable by members of the medical profession engaged in A. R. P. work, as also by those engaged in nursing, or first aid work.

THE MORPHOLOGY OF THE BRACHIAL PLEXUS—WITH A NOTE ON THE PECTORAL MUSCLE AND ITS TENDON TWIST.—By W. Harris, M.D., F.R.C.P. 1939. Oxford University Press, London; Humphrey Milford. Pp. xviii plus 117. Illustrated. Price, 25s. Obtainable from Oxford University Press, Bombay and Calcutta

THIS is an interesting work on the comparative anatomy of a very important nerve plexus with a short account of the pectoralis major muscle, which gives a new conception of the variations noted in the muscle in different types of animal, depending on the different functions it is called upon to perform.

It is an extremely painstaking effort which has spread over 37 years and is a tribute to the energy and enthusiasm of the author, because the immense amount of work it has entailed, containing as it does

the results of dissections on 158 animals ranging from amphibia to man, has been carried out in the intervals of a busy professional life as a physician.

It is a valuable study in comparative anatomy showing as it does the variation in the nerve roots which supply trunks to the brachial plexus, and that this is very largely dependent on other anatomical differences such as the different number of cervical vertebrae in different types of animal, and as such it is a distinct contribution to anatomical knowledge.

The illustrations are numerous, clear and well produced and the book is printed on heavy art paper, which is not a disadvantage in a comparatively small book, as the weight is not inconvenient.

It should prove of value to all professional anatomists.

TEXTBOOK OF MEDICINE.—By Various Authors. Edited by J. J. Conybeare, M.C., D.M. (Oxon.), F.R.C.P. Fourth Edition. 1939. E. and S. Livingston, Edinburgh. Pp. xx plus 1112. Illustrated. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 14

DR. CONYBEARE'S book does not need any introduction to the medical profession. It is one of the books which has given innumerable medical students of the last ten years their basic knowledge of medicine.

In this edition, a number of valuable additions have been made. The chief of these is a section on psychological medicine including the psychoses and the psycho-neuroses. This has led to the addition of about a hundred pages to the book. Several chapters have been rewritten in the light of recent advances, and several chapters on recently recognized clinical entities have been added. These improvements have further enhanced the value of an already excellent book.

The reviewer has but a few criticisms to make. As this book is read by medical students and practitioners in the tropics, it is desirable that the section dealing with the tropical diseases should be more comprehensive. Thirty-four pages allotted to this subject is too meagre, and this has led to inadequate description of important tropical diseases.

Certain recent advances in therapeutics have not been mentioned, e.g., M. & B. 693 in pneumonia, nicotinic acid or vitamin-B concentrates in pellagra, trichlorethylene in trigeminal neuralgia, ergotamine tartrate in migraine. It is nowadays not correct to say that 'ultimate outlook is poor' in the case of pellagra. Early and moderately advanced cases respond rapidly to specific treatment and relapse can be prevented by adding vitamin-B concentrates to the diet.

The get-up, printing and illustrations are excellent and reflect credit on the publishers.

The book will be found extremely valuable by medical students and general practitioners.

P. C. S. G.

AIDS TO FORENSIC MEDICINE AND TOXICOLOGY.

—By W. G. Atchison Robertson, M.D., D.Sc., F.R.C.P.E. Eleventh Edition. Edited by J. H. Ryffel, B.Ch., B.Sc. 1939. Baillière, Tindall and Cox, London. Pp. x plus 170

THAT it takes a great man to write a small book on a big subject could not be better exemplified than by this little book. Generations of medical students are indebted to two great men who gave them the distilled essence of forensic medicine in ten editions and thus created in them the confidence necessary for embarking on a study which can be and is vast indeed. The present writer also has done his best in the eleventh edition.

Opinion in a nut-shell is given on many topics, for example:—(i) if a child dies immediately after birth it is almost impossible to prove that it was born alive; (ii) it is not flattering to one's vanity to overlook a case of malingering, but should this occur little harm is done; and (iii) there is no practical advantage [for forensic purposes] in attempting to classify the different forms of insanity.

Treatment of toxicology is as complete as that of forensic medicine and includes the latest information on the poison rules. Essential information is available on poisonous fungi, which is often lacking in much bigger books, and on stimulating drugs. The use of types M & N in blood groups, in determining illegitimacy, is indicated.

The reviewer offers a few suggestions for the revision of the text in the next edition. M & N are 'types' not 'groups' and the animal used in preparing the anti-fluid for determining them is 'immunized' not 'activated'. Typhoid, para-typhoid and dysentery organisms may occur in food as a source of infection but they are not responsible for food poisoning. On page 77, para 1, line 5, 'associated' should be 'associate'; para 2, line 5, 'and vice versa' is obviously not required.

The paper, the size, the printing and the binding are good. The price, if it is the same as that of the tenth edition, namely 3s. 6d., is very reasonable. The book should be read by all interested in forensic medicine.

S. D. S. G.

SELECTED PICTURES OF EXTRA-OCULAR AFFECTIONS FROM THE MUSEUM OF THE GOVERNMENT OPHTHALMIC HOSPITAL, MADRAS, WITH EXPLANATORY NOTES FOR STUDENTS AND POST-GRADUATES.—By Lieut.-Colonel R. E. Wright, C.I.E., M.D., D.P.H., I.M.S. 1938. Government Press, Madras. Pp. 41 plus 48. Illustrated. Price, Rs. 2

LIEUTENANT-COLONEL WRIGHT and Dr. Koman Nayar have published in ingenious form a collection of stereoscopic pictures of extra-ocular affections, rendering generally accessible the best of the photographs which are to be seen in the stereoscope in the Elliot School of Ophthalmology in Madras.

While on a recent visit to Madras, the reviewer noticed how this valuable collection was deteriorating from the effects of the climate, and it is pleasant to know that by the publication of this folio a permanent record has now been made.

The pictures are rendered stereoscopic by looking at them through a pair of +6D spheres adjusted in a trial frame. The folio is so arranged as to permit simultaneous access to the notes which describe each picture.

This book should have a special appeal to post-graduate students in ophthalmology, and should find a place in the library of every medical school.

W. McN. N.

CLASSIC DESCRIPTIONS OF DISEASE WITH BIOGRAPHICAL SKETCHES OF THE AUTHORS.

By Ralph H. Major, M.D. Second Edition. 1939. Published by Charles C. Thomas, Springfield, Illinois. Pp. xxx plus 727. Illustrated. Price, 27s. Obtainable from Messrs. Baillière, Tindall and Cox, London

THE title of this book is a modest one for it is much more than 'Classic Descriptions of Disease', as it contains very many reproductions of portraits or photographs of the masters of medicine, and reproductions of title pages of famous ancient medical books and other interesting historical illustrations. There is also a brief but comprehensive biographical note on each of the masters as an introduction to the description of the disease for which he is famous. This method of presentation greatly adds to the vividness of the description, because with the biographical sketch fresh in one's mind one almost feels the man himself is speaking.

Descriptions of malaria and yellow fever have been included in this edition, both of which will add to the interest and value of the book to workers in the tropics.

It is a book that should be of great benefit to the student towards the end of his studies and it should also be a source of constant pleasure and valuable information to the practising physician and surgeon.

The volume is well bound and is printed on heavy art paper a fact which provides the reviewer's only criticism, and that is that it makes the book rather heavy to hold. This is a pity as it is essentially a book to read in an easy chair.

ACTINOTHERAPY AND DIATHERMY FOR THE STUDENT.—By E. B. Clayton, M.B., B.Ch. (Cantab.). 1939. Baillière, Tindall and Cox, London. Pp. viii plus 182. Illustrated. Price, 7s. 6d.

This little book is written for students preparing for the examinations of the Chartered Society of Massage and Medical Gymnastics. It is founded on the author's lecture notes and includes sections on short-wave diathermy and inductothermy.

It is divided into two parts—Part I—Light. Part II—Diathermy. Both sections are introduced by chapters on physics. There are sections on physiological effects, value in disease and technique of application.

The arrangement of subjects is logical and the phraseology lucid.

It is a book which should prove of value not only to the student, but to the general practitioner who is interested in these subjects.

J. A. S.

DIET AND ILL-HEALTH IN THE FOREST COUNTRY OF THE GOLD COAST.—By F. M. Purcell, M.D. (Dublin University), M.R.C.P. (Ireland), D.T.M. & H. (London). 1939. H. K. Lewis and Company, Limited, London. Pp. viii plus 77, with 62 illustrations. Price, 7s. 6d.

The author describes this small book as a 'paper' and this is a more or less correct definition because it is by no means a finished presentation of the subject.

It is composed of two parts. Part I is devoted to a brief description of the general physical characters of certain tribes in the Gold Coast and the diets they consume. This is necessarily incomplete as proper analysis of the various foods has not yet been undertaken.

Part II describes in brief, certain syndromes which on presumptive evidence are considered to be caused by dietetic deficiencies, and notes on illustrative cases are given.

The publication is only in the nature of a preliminary report on conditions in a part of West Africa and as such is of little interest elsewhere; but if it is followed by a better arranged and documented book it should be a useful addition to the subject of nutrition in general.

BRITISH MEDICAL SOCIETIES.—Edited by Sir D'Arcy Power, K.B.E., F.R.C.S. 1939. Published by the Medical Press and Circular, London. Pp. xvi plus 312. Illustrated. Obtainable from Messrs. Baillière, Tindall and Cox, London. Price, 10s. 6d.

The book gives brief histories of thirty-four medical societies in the British Isles. They are arranged in chronological order beginning with the Society of Apothecaries of London, 1617, and ending with the Kensington Medical Society, 1925.

It actually includes a good many more societies than thirty-four because in the course of their evolution many of them have changed their names or have become amalgamated with others. Each account is contributed by a different writer, usually one who has held or holds office in the executive of the society concerned, and they have been collected and edited by Sir d'Arcy Power whose special contribution is the history of the Abernethian Society.

These papers originally appeared in the *Medical Press and Circular* in the years 1936-1938 but collecting them into a single volume presents them in a handier form for preservation than scattered through the issues of a journal for three years, and as such makes a valuable addition to the history of medicine in the British Isles.

P. A. M.

BRITISH HEALTH RESORTS. 1939 Edition. Published by British Health Resorts Association Limited, Tavistock House (South), Tavistock Square, W.C.1.

This year the book is, for the first time, the property of the Association.

The information has been carefully revised and brought up to date. Those interested in medical climatology will find some new tables dealing with the 'Invalid's Winter on the Coast', followed by a general discussion of the British climate in winter (pp. 149 to 157).

The descriptions of the spas have been carefully revised as a result of visits recently carried out.

In the present state of uncertainty in Europe this publication is of even greater interest than formerly because few Englishmen would be prepared at present to visit the well-known spas on the continent, and in this book they can learn where they can obtain equally good health resorts in their own country.

AN INTRODUCTORY GUIDE TO BIOCHEMISTRY.—By S. Bilss, Ph.D. 1939. W. B. Saunders Company, Philadelphia and London. Pp. 103. Price, 5s. 6d.

The aim of this small book is stated to be to introduce the various divisions of the subject of biochemistry through a greatly simplified statement of them and thus avoid frightening the beginner with an extensive array of what at first appears incomprehensible and complicated graphic formulas.

The author has succeeded admirably, and in expressing this view the reviewer speaks feelingly, because he qualified in the days when a few lectures on organic chemistry, as an appendix to the ordinary preliminary chemistry instruction, were all that the student was told of the then practically unknown subject of biochemistry. The result of this is that in subsequent years he has painfully acquired a smattering of the subject in its modern form. Had such a book as this one been available it would have saved him many hours of reading to find out the meaning of many of the terms now employed, and his more recently trained colleagues the trouble of answering innumerable questions.

It is a book that a student would be well advised to read before embarking on the study of biochemistry.

Abstracts from Report

SEVENTY-SIXTH ANNUAL REPORT OF THE GOVERNMENT CINCHONA PLANTATIONS AND FACTORY IN BENGAL FOR THE YEAR 1937-38

The market prices of quinine salts continued to be steady during the year. Imports, which had been falling off for some time past, showed signs of rallying, in spite of the increased consumption of Indian cinchona products. This may mean merely an improvement in general trade conditions or else an increasing faith in quinine. Considering, however, the incidence of malaria in the country, it is surprising how small the consumption really is, being scarcely a third of the estimated requirements.

The solution of the problem depends obviously on a greatly extended production within the country, leading ultimately to a cheapening of the drug. Public attention has been focussed on the subject for a number of years. An enquiry was started in the latter half of the year, under the auspices of the Imperial Council of Agricultural Research, with a view to discovering new areas suitable for the cultivation of cinchona. Mr. A. Wilson, the officer in charge of this enquiry, has paid two visits to the Bengal plantations. It will be anticipating matters to give particulars of his impressions and his own report must be awaited in order to obtain, in due course, his considered views.

It would not, however, be out of place here to point out that a general survey of this nature, though it must lead to valuable technical conclusions and indicate possible lines of development, would require to be followed up by further and sustained observations. After 80 years of domestication cinchona still remains a plant of very fastidious habits and depends for its well-being on a great number of climatic and soil factors the optimum limits of which are not yet definitely known. Still less do we know the details of the climatic and soil conditions prevailing in the interiors of new areas which may appear from a general examination to be either suitable or unsuitable. It seems to be advisable, therefore, that any extensive areas, which may appear to be promising from a general survey, should remain under close observation for a period before large expectations are built upon them.

The extension of the actual area under cultivation is only one of the factors, though perhaps the main factor, in the problem of extended production. Auxiliary factors are (1) increasing the productivity of the land in respect of bark, and (2) improving the quality of the bark in respect of its content of the alkaloids. The first of these depends on improved methods of cultivation, the adoption of a cycle of operations suited to each individual region, and the application of suitable methods of soil rejuvenation after the successive cycles of cinchona. It would be a very unwise policy to concentrate on the extent of area alone and depend on rapid methods of exploitation. For, even assuming that land were plentiful, the cost of production would be kept within reasonable limits only if a given area could be made to yield the maximum possible result in order to reduce the incidence of overhead expenses and the heavy capital layout in opening up land and constructing buildings, roads and bridges.

The second auxiliary factor, namely, the content of alkaloids in the bark, is undoubtedly of the greatest importance in the problem of increasing production, for even a rise of one per cent in the quinine content of bark—our present average being 4 per cent—would lead to an increase of 25 per cent in production. An intensive programme of work in this direction, combining both biological and chemical investigations, should produce material results at a comparatively moderate expense.

Bengal is one of the provinces most seriously affected by malaria. It has been fortunate in its success up to date in establishing a cinchona industry. But it is less fortunate in that, owing to its geographical situation and general topographical features, there is not much likelihood of any great extent of fresh land being available for extension. The problems of improving the productivity of the land and the quality of the product are therefore of particular importance at this juncture. A well-planned programme of research, both in the laboratory and the field, is urgently called for.

The factory continued to work at full pressure throughout the year. Besides the extraction of bark and the preparation of quinine sulphate of various grades, numerous subsidiary salts and the usual variety of tablets were manufactured.

The total quantity of bark extracted during the year was 1,236,996 lb. This is a reduction of 12 per cent on the previous year and was due to the falling off in supplies from the plantations. The high quinine contents of the previous year were not maintained, Munson bark having an average of 4.43 per cent, Mungpoo bark 3.73 per cent and India bark 3.94 per cent as compared with the previous figures of 4.7, 4.08 and 4.92 respectively. The present figures correspond, however, to the percentages obtained in 1935-36.

Of the quinine sulphate from Indian bark 3,264 lb. were obtained in purified form, the balance of 1,159 lb. being left in the crude state. Of the yield from Bengal bark 13,030 lb. were left in the crude state and 29,361 lb. were purified to the Government standard. A further quantity of 6,622 lb. of this standard was prepared from bin stocks and other sources in order to cope with the demand for this product. Quinine

sulphate of B.P. standard was also prepared to the extent of 14,011 lb. The agency scheme which started towards the end of the previous working year got into full stride during the year under review. Demand was up to the yearly quantities agreed upon for supply, and the factory was kept fully occupied with the preparation of several high grade salts, both in powder and tablet form and in a great variety of packings.

The conversion of quinine sulphate to other salts shows a total of 1,327 lb. of which the hydrochloride and bishydrochloride, both B.P. standard and the ordinary standard, accounted for 1,249 lb., the balance being bisulphate, hydrobromide, bishydrobromide, salicylate and tannate.

There was a marked increase in the activity of the tablet department, a total of 23,407 lb. of products of all kinds being converted as against 12,380 lb. only in the previous year. In consequence, this department had to be run overtime at night for a considerable period of the year. A new line was reinforced cinchona febrifuge tablet, prepared from a mixture of cinchona febrifuge and quinine sulphate, for the Government of Assam. The quantities of different products converted into tablets were:—

Quinine sulphate, B.P.	..	185 lb.
Quinine sulphate, Government standard	14,154 "	
Quinine sulphate, crude	..	2,932 "
Cinchona febrifuge	..	3,924 "
Reinforced cinchona febrifuge	..	1,038 "
Other quinine salts	..	175 "
TOTAL	..	22,408 lb.

There was a considerable increase of activity in the laboratory also. Investigations were in progress on the continued improvement of the quality of products and of the efficiency of manufacturing processes. Over three hundred samples from the plantation were analysed in connection with cultural and valuation problems. In addition to numerous qualitative tests on the final products and intermediates, nearly sixteen hundred quantitative analyses were made during the year. All this work and the commencement of some essential enquiries, which had to be held over before, were facilitated by the inclusion of two new technical officers in the factory staff.

Service Notes

APPOINTMENTS AND TRANSFERS

BREVET-COLONEL B. C. ASHTON to be O. C., C. I. M. H., Dehra Dun. Dated 17th May, 1939.

Lieutenant-Colonel M. L. Dhawan to be Officer-in-Charge, I. H. C. Records, Kirkee. Dated 6th May, 1939.

Lieutenant-Colonel J. E. Ainsley to be O. C., I. M. H., Karachi. Dated 17th May, 1939.

Lieutenant-Colonel J. H. Smith, Civil Surgeon, Maymyo, made over, and Lieutenant-Colonel R. C. Phelps received charge of the duties of Civil Surgeon, Maymyo, on the afternoon of the 12th May, 1939.

Lieutenant-Colonel R. C. Phelps, Medical Superintendent, General Hospital, Rangoon, on transfer, made over, and Lieutenant-Colonel A. Ba Thaw received charge of the duties of the Medical Superintendent, General Hospital, Rangoon, on the forenoon of the 11th May, 1939.

Lieutenant-Colonel J. H. Barrett, Civil Surgeon, Toungoo, on proceeding on leave, made over, and Captain H. Min Sein received charge of the duties of the Civil Surgeon, Toungoo, on the afternoon of the 11th May, 1939.

Lieutenant-Colonel D. R. Thomas, O.B.E., Chemical Examiner to Government, Punjab, has been deputed to the Chemical Warfare School, India, Belgium, for training in Air Raid Precautions from the 14th May, 1939.

Lieutenant-Colonel P. B. Bharucha, O.B.E., D.S.O., Principal and Professor of Surgery, King Edward Medical College, Lahore, appointed to officiate as Inspector-General of Civil Hospitals, Punjab, in the leave vacancy of Colonel G. G. Jolly, C.I.E., V.H.S., from the 12th May, 1939.

Lieutenant-Colonel A. M. Dick, C.B.E., V.H.S., Professor of Ophthalmic Surgery, appointed to officiate as Principal, King Edward Medical College, Lahore, in addition to his own duties from the 12th May, 1939.

Lieutenant-Colonel V. R. Mirajkar, O.B.E., Professor of Operative Surgery, appointed to officiate as Professor of Surgery, King Edward Medical College, Lahore, *vice* Lieutenant-Colonel P. B. Bharucha, O.B.E., D.S.O., from the 12th May, 1939.

Lieutenant-Colonel N. D. Puri, Deputy Inspector-General of Prisons, Punjab, appointed to officiate as Inspector-General of Prisons, Punjab, with effect from the 17th May, 1939, *vice* Lieutenant-Colonel F. A. Barker, C.I.E., O.B.E., granted leave.

Lieutenant-Colonel P. D. Chopra, Superintendent, New Central Jail, Multan, appointed to officiate as Deputy Inspector-General of Prisons, from the 17th May, 1939, *vice* Lieutenant-Colonel N. D. Puri.

Lieutenant-Colonel G. D. Malhontra, Civil Surgeon, from Shahjahanpur to Sitapur.

The services of Lieutenant-Colonel T. C. Boyd, Officiating Surgeon-General with the Government of Bengal, are placed at the disposal of the Government of the United Provinces, with effect from the 10th June, 1939.

Major B. S. Nat, Professor of Anatomy, appointed to officiate as Professor of Operative Surgery, King Edward Medical College, Lahore, *vice* Lieutenant-Colonel V. R. Mirajkar, O.B.E., from the 12th May, 1939.

Major J. J. Beausang, Civil Surgeon, Sargodha, posted as Civil Surgeon, Amritsar, from the 11th May, 1939, *vice* Lieutenant-Colonel P. A. Dargan, granted leave.

Major J. McM. Wilder to be Officiating O. C., I. M. H., Jubbulpore. Dated 17th April, 1939.

Major N. J. U. Mather to be specialist in Mental Diseases, Western India District. Dated 19th May, 1939.

Major T. A. Malone to be attached officer, Medical Directorate, Army Headquarters. Dated 27th May, 1939.

Major E. S. S. Lucas, Civil Surgeon, Moradabad, from the 14th May, 1939.

Major W. Lawie, Civil Surgeon, from Agra to Bareilly, *vice* Major R. A. Wesson, granted leave.

As a temporary measure Major A. N. Chopra, Assistant Director-General, I. M. S., is appointed Officer-in-Charge, Medical Store Depot, Lahore Cantonment, with effect from the forenoon of the 24th April, 1939, on which date he took over charge of the Depot, from 1st class Assistant Surgeon E. Duckworth, M.B.E.

Major K. S. Fitch made over charge of the Burdwan Jail to Dr. K. C. Sen Gupta on the forenoon of the 15th May, 1939.

In modification of previous Notification Major F. H. Whyte is appointed to the post of Civil Surgeon, Simla West, with effect from the forenoon of the 15th April, 1939.

Captain F. C. Leach, Superintendent, Mental Hospital, Nagpur, and Civil Surgeon and Superintendent, Robertson Medical School, Nagpur, ceased to be Superintendent, Mental Hospital, Nagpur, with effect from the 16th May, 1939.

Captain M. Sendak, Civil Surgeon, Saugor, has been transferred as Senior Medical Officer, Port Blair.

Captain T. F. O'Donnell, whose services have been placed temporarily at the disposal of the U. P. Government for Civil employ on completion of three weeks' training, has been posted as Civil Surgeon, Jhansi, with effect from the 6th May, 1939.

Captain J. D. Murdoch was transferred to civil employ as Superintendent, Medical School, and Civil Surgeon, Cuttack. Dated 9th May, 1939.

Captain T. F. O'Donnell, Civil Surgeon, Jhansi, with effect from the 6th May, 1939.

Captain Sadi Ahmad, Civil Surgeon, from Sitapur to Agra, *vice* Major W. Lawie, transferred.

Captain W. T. Taylor, on relinquishing charge of the Medical Store Depot, Lahore Cantonment, is appointed as Officer-in-Charge, Medical Store Depot, Madras, with effect from the forenoon of the 20th April, 1939, relieving Captain D. M. Frost.

Captain A. H. Barzilay to be Staff Captain (Medical), Western India District. Dated 25th April, 1939.

Captain P. N. Bardhan to be Officer-in-Charge, Brigade Laboratory, Jhansi. Dated 8th May, 1939.

Captain L. U. Kamm to be Officiating O. C., I. M. H., Aurangabad. Dated 27th May, 1939.

The undermentioned short service I. M. S. Officers have been granted permanent commissions from the dates noted opposite their names:—

Captain B. N. Bhandari. Dated 21st May, 1939.

Captain B. L. Kapur. Dated 22nd May, 1939.

Captain P. M. Kaul. Dated 26th May, 1939.

The undermentioned short service I. M. S. Officers have been released from the service from the dates noted:—

Captain M. L. Gujral. Dated 19th May, 1939.

Captain Mohan Singh. Dated 21st May, 1939.

Captain D. R. Sharma. Dated 23rd May, 1939.

Captain G. N. Ahmadi. Dated 25th May, 1939.

Captain P. S. Bassalvi. Dated 25th May, 1939.

To be Captains (on probation)

Baij Nath Bhandari. Dated 21st May, 1939, with seniority from 21st May, 1935.

Behari Lal Kapur. Dated 22nd May, 1939, with seniority from 22nd May, 1935.

Prince Mohan Kaul. Dated 26th May, 1939, with seniority from 26th May, 1935.

The undermentioned Officers arrived in Bombay on first appointment on the dates shown opposite their names:—

Captain V. D'A. Blackburn. Dated 5th May, 1939.

Lieutenant L. E. Elkerton. Dated 28th April, 1939.

Lieutenant C. C. Harvey. Dated 24th May, 1939.

Lieutenant L. H. Cooper. Dated 12th May, 1939.

Lieutenant J. A. M. Cameron. Dated 12th May, 1939.

Lieutenant W. S. Hacon. Dated 12th May, 1939.

Lieutenant A. M. Best. Dated 12th May, 1939.

Lieutenant R. J. McGill. Dated 12th May, 1939.

Lieutenant J. Lightbody. Dated 12th May, 1939.

Lieutenant D. F. Eastcott. Dated 12th May, 1939.

Lieutenant H. F. T. MacFetridge. Dated 12th May, 1939.

To be Lieutenants

Sailendra Mohan Basu. Dated 17th March, 1939.

Amar Nath Roy. Dated 20th March, 1939.

The Secretary of State for India has appointed to the Civil Branch of the Indian Medical Service the undermentioned Officers of the Indian Medical Service with effect from the 1st April, 1937. These Officers will count their seniority in civil employment with effect from the dates noted against their names, being the dates on which they joined civil employment:—

Government of India

Major H. W. Farrell. Dated 12th May, 1934 (afternoon).

Captain G. K. Graham. Dated 5th November, 1934.

Major B. Chaudhuri. Dated 18th April, 1935 (afternoon).

Major W. D. B. Read. Dated 12th June, 1935.

Captain W. J. Moody. Dated 30th June, 1935 (afternoon).

Captain M. Jafar. Dated 4th July, 1935.

Captain R. D. McRae. Dated 3rd September, 1935 (afternoon).

Lieutenant-Colonel A. D. Loganadan. Dated 9th September, 1935.

Major A. N. Chopra. Dated 8th November, 1935 (afternoon).

Captain J. R. Dogra. Dated 16th November, 1935.

Major C. K. Lakshmanan. Dated 16th December, 1935.
 Captain C. J. H. Bink. Dated 23rd December, 1935.
 Major M. K. Afridi. Dated 4th January, 1936.
 Major K. H. A. Gross, M.C. Dated 19th April, 1936 (afternoon).
 Captain E. A. O'Connor. Dated 22nd October, 1936.
 Captain J. Guthrie. Dated 9th March, 1937.

Madras

Major F. M. Collins. Dated 30th October, 1934.
 Captain J. S. McMillan, C.M. Dated 15th November, 1934.
 Captain R. L. Haviland Minchin. Dated 30th April, 1936.
 Captain F. A. B. Sheppard. Dated 3rd September, 1936.
 Major P. V. Karamchandani. Dated 29th September, 1936.
 Major S. T. Davies. Dated 7th December, 1936.
 Major Lakshman Dass. Dated 30th January, 1937.
 Lieutenant-Colonel S. C. Alagappan. Dated 20th February, 1937.

Bombay

Captain B. S. Sandhu. Dated 1st June, 1935.
 Captain R. DeSoldenhof. Dated 3rd February, 1937.

Bengal

Lieutenant-Colonel B. G. Mallaya. Dated 3rd July, 1923.
 Lieutenant-Colonel B. H. Singh. Dated 12th May, 1925.
 Lieutenant-Colonel P. C. Banerjee. Dated 13th May, 1925, since retired.
 Major T. H. Thomas. Dated 30th September, 1927.
 Major C. L. Pasricha. Dated 1st January, 1929.
 Lieutenant-Colonel S. Nag. Dated 1st July, 1931.
 Major D. C. Drummond. Dated 15th February, 1932.
 Major R. Linton. Dated 14th April, 1932.
 Major K. S. Fitch. Dated 26th May, 1934.
 Major E. G. Montgomery. Dated 7th June, 1934 (afternoon).
 Captain G. B. Fisher. Dated 11th June, 1934.
 Major G. Kelly. Dated 13th July, 1934.
 Captain F. H. A. L. Davidson. Dated 1st November, 1934.
 Captain E. H. Lossing. Dated 12th June, 1936.
 Captain F. W. Allinson. Dated 16th November, 1936.

United Provinces

Lieutenant-Colonel J. C. Bharucha. Dated 19th April, 1923.
 Major G. D. Malhoutra. Dated 21st June, 1934 (afternoon).
 Captain M. R. Sinclair, O.B.E. Dated 26th June, 1935.
 Major S. C. H. Worleline. Dated 16th October, 1936.
 Major R. K. Misra. Dated 2nd January, 1937.
 Captain Said Ahmad. Dated 15th February, 1937.
 Captain J. H. Boulton. Dated 19th March, 1937.

Punjab

Captain B. Temple Raston. Dated 15th March, 1935.
 Captain P. C. Dutta. Dated 10th October, 1935.
 Major J. J. Beausang. Dated 22nd April, 1936.
 Captain J. P. J. Little. Dated 30th August, 1936.
 Captain Ilahi Bakhsh. Dated 25th September, 1936 (afternoon).
 Major G. F. Taylor. Dated 1st October, 1936.
 Lieutenant-Colonel W. Ross Stewart, C.I.E. Dated 10th February, 1937.

Bihar

Major M. S. Gupta. Dated 3rd July, 1934.
 Captain D. P. Nath. Dated 28th April, 1935.
 Captain R. T. Hicks. Dated 8th October, 1935.
 Lieutenant-Colonel G. H. Mahony. Dated 9th October, 1935.
 Captain H. J. Curran. Dated 7th May, 1936 (afternoon).
 Captain A. W. West. Dated 22nd June, 1936.

Central Provinces and Berar

Lieutenant-Colonel J. M. R. Hennessy. Dated 4th May, 1924.

Captain V. Srinivasan. Dated 22nd February, 1937.

Assam

Lieutenant-Colonel E. T. N. Taylor. Dated 29th June, 1936.

North-West Frontier Province

Lieutenant-Colonel P. H. S. Smith, O.B.E. Dated 1st November, 1932.

Captain H. D. R. Zscherpel. Dated 15th March, 1933.

Captain H. H. Mahmood. Dated 18th March, 1935.
 The Secretary of State for India has appointed to the Civil Branch of the Indian Medical Service the following Officers of the Indian Medical Service with effect from the dates stated against their names:—

Government of India

Captain M. H. Shah. Dated 15th April, 1937.
 Colonel E. G. Kennedy. Dated 30th June, 1937.
 Captain F. M. Khan. Dated 14th September, 1937.
 Captain J. D. Grant. Dated 12th November, 1937.

Madras

Captain J. Eddis-Myres. Dated 1st July, 1937.
 Major E. M. Sewell. Dated 28th October, 1937.
 Captain W. Ilapper. Dated 24th December, 1937.

Bombay

Captain A. A. Pillar. Dated 7th July, 1937.
 Captain C. B. Miller. Dated 6th August, 1937.

Bengal

Major S. Annaswami. Dated 3rd April, 1937.

Bihar

Captain A. C. Taylor. Dated 8th July, 1937.
 Major deL. Carey. Dated 20th November, 1937.

LEAVE

Colonel F. F. S. Smith, A. D. M. S., Peshawar District, proceeded on 5 months' combined leave *ex-India* from 27th April, 1939.

Colonel W. A. M. Jack, O.B.E., O. C., I. M. H., Rawalpindi, sailed from Bombay per S.S. *Viceroy of India* on 6 months' leave on medical certificate on 13th May, 1939.

The following Officers have proceeded on leave with effect from the dates mentioned:—

Colonel G. G. Jolly, C.I.E., 3 months and 15 days *ex-India* from the 12th May, 1939.

Lieutenant-Colonel P. A. Dargan, 7 months *ex-India* from the 9th May, 1939.

Lieutenant-Colonel S. N. Hayes, 15 days *ex-India* from the 1st June, 1939, with permission to affix thereto the College vacation from the 16th June, 1939, to 30th September, 1939.

Lieutenant-Colonel F. A. Barker, C.I.E., O.B.E., leave *ex-India* from the 17th May, 1939, to 16th October, 1939, preparatory to retirement.

Lieutenant-Colonel J. P. Cantenwala, Officer-in-Charge, Medical Store Depot, Madras, is granted 8 months' leave, with effect from the 28th February, 1939, the first 2 months being privilege leave and the rest on medical certificate.

Lieutenant-Colonel S. A. Phatak, I. M. H., Bangalore, proceeded on 6 months' combined leave in India pending retirement. Dated 24th April, 1939.

Lieutenant-Colonel R. S. Aspinall, C.I.E., an Agency Surgeon, is granted leave on average pay for 3 months under the Fundamental Rule, with effect from the forenoon of the 6th May, 1939.

Lieutenant-Colonel J. H. Barrett was granted 4 months and 21 days' leave on average pay preparatory to retirement from the afternoon of the 11th May, 1939.

Lieutenant-Colonel F. J. Anderson, Professor of Surgery, Medical College, Calcutta, is granted leave *ex-India* for 2 months, with effect from the 18th May, 1939.

The undermentioned Officers proceeded on privilege leave *ex-India*, pending resignation, from the dates noted opposite their names:—

Captain N. P. Woodgate-Jones. Dated 10th May, 1939.

Captain J. W. Richmond. Dated 26th May, 1939.
 Captain J. H. Briscoe-Smith. Dated 5th May, 1939.

PROMOTIONS

The following Officers have been promoted to the selected list of Lieutenant-Colonels with effect from the dates noted against their respective names:—

Lieutenant-Colonel W. Ross Stewart, C.I.E. Dated 31st January, 1939.

Lieutenant-Colonel H. Chand. Dated 5th March, 1939.

Majors to be Lieutenant-Colonels

J. R. Katariya. Dated 16th April, 1939.

C. V. D. Rose. Dated 25th April, 1939.

The provisional promotion to present rank of Major A. K. Gupta is confirmed.

Note.—The promotion to present rank of Major G. J. Smith notified in the late Army Department Notification No. 597, dated the 14th October, 1933, is antedated from the 7th October, 1933, to 7th April, 1933. He qualified for accelerated promotion on 25th January, 1939.

Captains to be Majors

Ilahi Bakhsh. Dated 8th April, 1939.

R. T. Hicks. Dated 22nd April, 1939.

A. M. Sheridan. Dated 29th April, 1939.

Lieutenants (on probation) to be Captains (on probation)

E. J. Somerset. Dated 12th March, 1939, with seniority from 1st May, 1938.

L. D. B. Frost. Dated 12th March, 1939, with seniority from 1st May, 1938.

A. M. Mackenzie. Dated 12th March, 1939, with seniority from 1st May, 1938.

R. M. McCullough. Dated 12th March, 1939, with seniority from 1st November, 1938.

H. V. Morris. Dated 12th March, 1939, with seniority from 1st November, 1938.

F. W. Snedden. Dated 12th March, 1939, with seniority from 1st November, 1938.

J. L. M. Whitbread. Dated 12th March, 1939, with seniority from 1st November, 1938.

Lieutenant S. M. Basu was appointed to a short service commission from 17th March, 1939, and promoted to Captain from same date with seniority from 4th January, 1938.

RELINQUISHMENTS

Lieutenant-Colonel A. Ba Thaw relinquished charge of his duties as Assistant Inspector-General of Civil Hospitals, Burma, on the afternoon of the 10th May, 1939.

Lieutenant (on probation) R. N. Houlding relinquished his probationary appointment, 29th March, 1939.

Flight-Lieutenant Vivian D'Arcy Blackburn relinquishes his commission on appointment to a commission in the Indian Medical Service, 11th April, 1939.

Notes

VEGANIN

THE subject of pain is always with the physician, commanding his interest, both in its physiological and psychological aspects and especially in the challenging problem as to how he may appreciate its diagnostic significance, pay due heed to its warnings, and mobilize available resources for its relief and conquest.

Anatomists and physiologists, surgeons and psychologists and many clinical observers among general practitioners, are all making their contribution to-day to the investigation and alleviation of pain.

To the physician pain is but a symptom, an alarm signal; but to the patient it is an affliction that is very real and which demands early relief. The type of pain, its location, distribution, and time of occurrence; all these have a diagnostic significance, but once they have served as a guide, to let pain continue unrelieved is to give it a free rein in causing suffering and disability.

A number of analgesics have been placed in the hands of doctors by manufacturers for the prevention and alleviation of pain; but one that has been the subject of high commendation in medical and dental journals, in Great Britain and other parts of the world, is Veganin.

The manufacturers are Messrs. William R. Warner and Co., Ltd., of London, who state that 'Veganin is a dependable, safe and highly effective analgesic, sedative and antipyretic with marked antispasmodic properties'.

Veganin is presented in the form of tablets which are prepared by a special process that ensures rapid disintegration, ready utilization and prompt therapeutic action. It is claimed that the administration of Veganin is free from elements of danger, and the preparation, therefore, provides a welcome substitute for the barbiturates.

The manufacturers further state that 'Veganin can be used for the relief of pain and its nervous manifestations in a large number of conditions; and in febrile conditions its administration results in early remission of the temperature. Its use as an analgesic in absence of fever leaves the temperature unaffected'.

THE 48TH CHEMISTS' EXHIBITION, LONDON

THE Chemists' Exhibition in London is one of the most important events of the year. The 48th will be held from 18th to 22nd September next in the famous Royal Albert Hall. The management, 'The British and Colonial Pharmacist', is always pleased to welcome members of the drug trade from Overseas and they are admitted on presentation of business card. Solely for the trade, it reflects the advance in the previous 12 months.

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Original Articles

RAT-BITE FEVER IN CALCUTTA

By R. N. CHOPRA, C.I.E., K.H.P., M.A., M.D.,
sc.D. (Cantab.), F.R.C.P. (Lond.)

BREVET-COLONEL, I.M.S.

B. C. BASU, D.Sc.

and

S. SEN, M.B., D.T.M.

(From the School of Tropical Medicine, Calcutta)

ALTHOUGH rat-bite fever has been reported from different parts of the world, only about 150 cases have been recorded in the literature. The present authors have records of 455 typical cases of this disease, studied in the Carmichael Hospital for Tropical Diseases, and in the out-patient department of the School of Tropical Medicine, with observations regarding its incidence in relation to season, age, diagnosis and treatment. Experimental work has also been done with regard to the disease in animals and the course it runs in them, which will be published in a separate paper.

As rat-bite fever is not commonly met with in India a short account of this condition will not be out of place.

Rat-bite fever is primarily an affection of rats and man is infected secondarily following the bite of a rat or rarely of a weasel, ferret, squirrel, or cat. The fever is of a relapsing type, the causal organism being *Spirillum minus*. This organism has comparatively broad, pre-formed and rigid spirals about 2 to 5 μ in length; occasionally longer forms 9 to 10 μ in length are seen; the number of coils varies from 2 to 4 or even 8 or 9 in the longest forms. Flagella varying from one to seven in number are present at each end, and multiplication takes place by transverse binary fission. Carter (1887) first discovered this organism in the blood of rats in Bombay and the parasite was first discovered in man by the Japanese workers Futaki, Tikaki, Taniguchi and Osumi (1916). Usually the bite heals up and nothing further happens till 2 to 6 weeks later when the site of the bite becomes inflamed and some local lymphangitis is observed. The temperature then rises with rigors and prostration which lasts for 3 to 6 days. The recurrence of paroxysms of fever at intervals of 5 or 6 days is a characteristic feature of the disease. With each paroxysm, there may be a rash, leucocytosis and eosinophilia. The disease has been known in Japan for many years and in America it has been known for nearly a century. Crohn (1915) collected histories of 24 Japanese cases, 16 American, 8 English, 2 French, 1 Italian, and 1 Indian. Blake (1916) added 28 more cases.

From 1918 to 1927, 72 cases were reported as follows :—

England ..	12	Russia ..	2	China ..	3
France ..	8	Holland ..	2	Mexico ..	1
U. S. A. ..	8	Italian ..		Hawaii ..	1
Australia ..	2	Somaliland ..	1	Brazil ..	6
India ..	4	New Guinea ..	1	Br. Guiana ..	1
Italy ..	15	Austria ..	2	Germany ..	1
Spain ..	1	Switzerland ..	1		

Knowles and Das Gupta (1928) added another 28 cases from Calcutta during 1920-28.

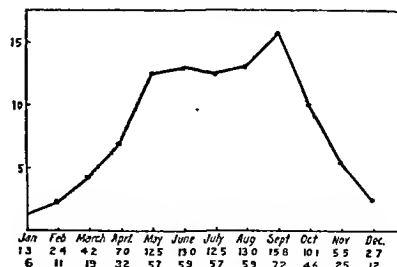
During the period of five years, that is 1931 to 1936 (records for October 1931 and September 1932 were not available), 876 persons reported themselves to the out-patient department for treatment with history of rat-bite. Of these, 455 (a little over 50 per cent) developed typical symptoms of the disease. This figure is significant in view of the fact that a comparatively small percentage of the wild rats in the city of Calcutta shows infection. Exudate from the site of the bite was examined in 191 cases under dark-ground illumination and in 123 cases (64.2 per cent) actively motile *S. minus* were seen. Blood of 56 typical cases was inoculated into white mice and in 39 (69.8 per cent) was found infective. Blood from 13 cases was inoculated into young guinea-pigs and in 10 (77 per cent) infection occurred. It is worthy of note that examination of peritoneal fluid and blood of white mice and young guinea-pigs in Calcutta showed that in many cases they harboured *S. minus* in their natural condition. Precautions have, therefore, to be taken to exclude this before using them for experimental purposes.

In the remaining 195 cases, though spirilla were not discovered by any of the above methods, the clinical symptoms were typical of the disease and they also responded to the usual treatment with arsenical compounds.

So far as the seasonal incidence is concerned (see graph) the largest number of cases occurred

CHART

Seasonal incidence of 455 cases of rat-bite fever during five years (1931-36).



during the months of May and September. This shows that in Calcutta the disease was more common in hot weather. This may be due to the fact that during this period many people sleep in the open and under unprotected conditions, thus increasing the chance of a bite

from a rat. Another possibility is that the natural infection in rats during this period may be higher. These points are now under investigation.

Table I gives the incidence of the disease with regard to the age of the patients. It will be observed that the highest incidence is between the ages of 21 and 30 years and next between the ages of 31 and 40 years. In this series there were a few babies below the age of one year.

TABLE I

Age of the patient			Incidence during 1931-36
Up to 10 years	..	..	40
11 to 15	..	..	21
16 to 20	..	..	38
21 to 30	..	..	160
31 to 40	..	..	106
41 to 50	..	..	66
Over 50	..	..	24
TOTAL			455

Sex and caste of the patients were recorded and are summarized in table II. It will be seen that neither caste nor sex appears to have any significance so far as susceptibility to infection is concerned.

TABLE II

Rat-bite fever—caste and sex

Caste	Male	Female	Total
Hindus ..	236	115	351
Mohammedans	60	34	94
Anglo-Indians	2	2	4
Indian Christians	1	3	4
Other castes ..	2	..	2
	301	154	455

Location of the wound in these cases was mostly on the hand, arm, leg or foot; in a few cases the bite was inflicted on the face, eyebrow, nose, head, shoulder or abdomen. Bites on exposed parts were more apt to result in infection and production of the disease than on protected parts, where the clothing might wipe off the organism from the teeth. The bite of an infected animal may not invariably result in infection, since there were several instances of two persons being apparently bitten by the same rat and only one contracting the disease.

Treatment

In the treatment of this series we used four organic arsenical compounds, these being novarsenobillon (N.A.B.), solu-salvarsan, sulpharsenol and sulpharsamine. Before starting treatment

due precautions were taken to see that no definite contra-indications existed against the use of arsenical compounds in any of the patients.

During the period 1934-36, 128 patients suffering from rat-bite fever were treated with novarsenobillon, three intravenous injections being given at intervals of 5 to 7 days. The ages of these patients varied from 16 to 66 years and the usual dosage administered was 0.3 gm. for the first injection, 0.45 gm. for the second and 0.45 to 0.6 gm. for the third injection. Some patients who were given smaller doses (0.15, 0.3 and 0.45 gm.) also responded to treatment. All the cases reacted to treatment in this group and there were no failures.

Intramuscular injections of solu-salvarsan were tried on 174 cases during the period 1934-36. The age of the patients varied from 4 months to 60 years. The usual curative dosage for adults was three weekly intramuscular injections of 3, 4 and 5 c.cm. of the drug. In this series 9 patients relapsed and were successfully treated afterwards with the usual doses of N.A.B. This compound is in solution and is often stored by druggists in this country for varying periods under conditions of high temperature and humidity before it is used. There is, therefore, considerable risk of its deterioration.

During 1934-36 sulpharsenol was used in the treatment of 20 cases (9 children and 11 adults). Generally three intramuscular injections at weekly intervals were given. All the nine children were cured and no relapses were reported. The dosage for children was: 0.25, 0.25 and 1.0 cg. for babies 2 to 3 months old; 1.0, 1.0 and 1.0 cg. for those 4 months old and 6.0, 12.0 and 18.0 cg. for those 9 years old. Out of a series of 11 adults, 6 came back with relapses and were subsequently cured with the usual dosage of N.A.B. Five adults, however, recovered, the curative dose in these being 24.0, 30.0 and 36.0 eg. in three injections. For children it is advisable to use this drug, as it is less toxic and more convenient, inasmuch as it can be given by the intramuscular route and does not produce any pain. In adults there were failures with the dosage prescribed above, but it is possible that higher doses might be more effective.

Lastly, at the suggestion of Dr. J. C. Gupta, sulpharsamine (Thiarsin), a new arsenical compound manufactured by Messrs. Bengal Chemical and Pharmaceutical Works, was tried in a series of 17 cases of rat-bite fever. The ages of the patients varied between 17 and 56 years. The usual curative adult dose was found to be three intravenous injections of 0.3, 0.45 and 0.6 gm. of the drug respectively, at intervals of 5 to 7 days. No untoward symptoms were observed and no relapses occurred in the cases treated. This compound is worthy of further trial as it is prepared in India and is cheaper.

Sulpharsamine (Thiarsin) can be administered by the intramuscular route also and has been

largely used in this way in the treatment of syphilis, without any untoward symptoms.

The results of administration of the various arsenical compounds are given in the following table :—

TABLE III.

Drug	Number of cases	Number cured	Number relapsed
N.A.B. ..	128	128	None
Solu-salvarsan ..	174	165	9
Sulpharsenol ..	20	14	6
Sulpharsamine ..	17	17	None

We have observed that in some patients treated with sulpharsenol in usual doses, not only was the cure not affected but the subjects became resistant and needed larger dosage and a more prolonged course of N.A.B. to effect a cure. It is difficult to explain this condition as Robertson (1930) stated that small doses of arsenical compounds do not cause the formation of arsenic-resistant forms.

Summary

In Calcutta, rat-bite fever appears to be mainly a hot weather disease.

During the period 1931 to 1936, 876 cases attended the out-patient department of the School of Tropical Medicine with history of rat-bite; 455 of these developed typical symptoms of rat-bite fever. Out of 191 examined *S. minus* was isolated from 123 cases from the exudates from the site of bite. Out of 69 cases examined by animal inoculation 49 gave positive results. The rest were clinically typical cases of rat-bite fever and all responded to arsenical treatment. N.A.B., sulpharsenol, solu-salvarsan and sulpharsamine were used for treatment. Of 128 cases treated with N.A.B. all were cured. Some cases which relapsed with sulpharsenol and solu-salvarsan were cured with N.A.B. Out of 20 cases treated with sulpharsenol 6 relapsed, the rest were cured. Out of 174 cases treated with solu-salvarsan 9 relapsed and the rest were cured. Seventeen cases treated with sulpharsamine were all cured.

Two drug-resistant cases are recorded.

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TREATMENT OF LOBAR PNEUMONIA WITH M. & B. 693

By ANTHONY CAPLAN, M.D., M.R.C.P. (Lond.)
 Senior Assistant Medical Officer, Kolar Gold Fields Hospital

THE introduction of antipneumococcal serum in the treatment of pneumococcal infections constituted the first real advance in pneumonia therapy in recent years. It was the only treatment to give consistently good results. The great expense, the special facilities needed for typing, and the fact that treatment is most efficacious when instituted before the third day of the disease, made its general use impossible. More recently, hopes were raised when sulphanilamide was added to the physician's armamentarium, but in pneumococcal infections the results were at first disappointing. In 1938 Whitby demonstrated that M. & B. 693, a drug related to sulphanilic acid and to aminopyridine, protected mice against 10,000 lethal doses of pneumococci type I. Later in the year Evans and Gaisford (1938) published the results of the treatment of 100 cases of lobar pneumonia with M. & B. 693. The mortality was 8 per cent compared with 27 per cent in a controlled series of 100 untreated cases. It was also obvious that in the treated cases the temperature fell to normal sooner than in the controlled series. Further encouraging reports on the use of this drug in lobar pneumonia have since appeared [Dyke and Reid (1938), Anderson (1939), Agranat *et al.* (1939)].

Lobar pneumonia on the Kolar Gold Fields

The Kolar Gold Fields Medical Department supervises the health of 28,000 mining employees, 60 per cent of whom are underground workers. The average number of patients admitted annually to the hospital totals 5,000. Table I gives the number of admissions for the years 1934 to 1938 of patients suffering from lobar pneumonia and the mortality rates. It also demonstrates that this disease accounts for more deaths than all other diseases.

TABLE I

Year	Cases of lobar pneumonia treated	Number of deaths	Death rate per 100 treated	Per cent of pneumonia deaths to total mortality
1934	353	136	38.5	60.1
1935	245	138	56.3	59.4
1936	238	94	39.5	54.9
1937	273	62	22.7	48.0
1938	254	69	27.1	47.1

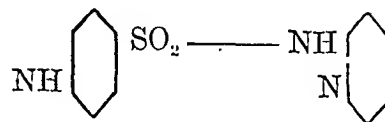
It is evident from these figures that lobar pneumonia on the Kolar Gold Fields is a disease of major importance. The exceptionally high mortality rate for 1934 to 1936 could be attributed to the increased virulence of the invading organism. One other factor which has certainly helped to swell the death rate is the difficulty experienced in inducing coolies to report sick at the onset of their illness. In recent years, however, as the result of a campaign encouraging coolies to report sick on the first signs of illness, there has been an appreciable improvement in this respect. Table III tends to confirm this fact; of the present series of cases (treated in 1938-1939), 43 per cent were admitted to hospital after the third day of their disease, compared with 61 per cent in a series of cases treated in 1937-1938. The lower mortality rates for the years 1937 and 1938 might in part be due to the earlier admission of patients to hospital, combined with the improved conditions under which the coolie is housed, and the improved nursing facilities.

The resistance of the coolie to infection is low, and malnutrition is common. In the present series of 100 cases, 12 had signs of a vitamin-B deficiency. The tongue and mouth lesions in all cases responded to marmite therapy. Hookworm infestation is common. In 1938, Dr. W. B. Roantree found evidence of hookworm in 77 per cent of coolies examined. It is unlikely, however, that excepting in severe infestations is the course of the disease affected. The underground worker is also liable to respiratory disease associated with the inhalation of dust. Evidence of the severity of lobar pneumonia on the Kolar Gold Fields is the comparatively large number of cases with consolidation of more than one lobe—37 per cent in the present series, as compared with 9 per cent in the 100 cases reported by Evans and Gaisford.

The paper of Evans and Gaisford was so impressive that it was decided to treat all cases of lobar pneumonia with M. & B. 693. It was realized that the omission of a series of controls would detract from the scientific value of the work, but it was felt there was no justification in withholding the drug. One hundred cases (96 coolies and 4 Anglo-Indians) have been treated with M. & B. 693 from November 1938 to March 1939. Thirty-six were classified on admission as mild, 34 moderate, and 30 severe. One hundred and sixty-four cases treated by the writer between March 1937 and October 1938 are cited as a comparison. It is a notorious fact that the virulence of pneumococcal infections varies from year to year, and that the results of the treatment of series of cases at different times are not strictly comparable. Nevertheless, if only because of the striking differences, a comparison is made. Apart from the use of M. & B. 693 in the present series, the treatment in all cases was identical and was purely symptomatic.

Chemical structure of M. & B. 693 and dosage

M. & B. 693 is related to sulphanilic acid and to aminopyridine, and has the following formula:—



It is supplied for oral administration in tablets containing 0.5 gramme of the active substance, and for parenteral administration in ampoules each containing a similar quantity of the drug. The tablets are easily swallowed with water and have a faintly bitter taste. The parenteral route was not employed in this series.

The first sixteen cases received 2 tablets (1 gm.) *t.d.s.*, but this dose was found to be inadequate for the more severe cases. All patients admitted after the beginning of December 1938 were given 3 tablets (1.5 gm.) four-hourly for the first twenty-four hours then 2 thrice daily continued until the patient was afebrile for twenty-four hours. Occasionally in cases not responding after two days, the dose was increased to 3 tablets four-hourly or *t.d.s.* The majority of cases therefore received 15 or 18 tablets (7.5 or 9 gm.) in the first twenty-four hours, and subsequently 6 tablets (3 gm.) daily. The smallest dose given to an adult was 6 gm. and the largest 82 gm. (case 76). Seventy-three per cent of all cases received 15 gm. or less.

Action of M. & B. 693

Fleming (1938) has shown that M. & B. 693 'retards the growth in human blood of pneumococci and streptococci in concentrations which is reasonable to suppose can be obtained therapeutically'. The action of the drug is bacteriostatic and not bacteriocidal. Presumably rapid development of pneumococci in the blood is in some manner prevented, and the polymorphonuclears are able to overcome the bacterial invasion sooner than if the drug was withheld. Flippin *et al.* (1939) estimated the concentration of M. & B. 693 in the blood of pneumonia patients treated with the drug. They found concentrations varying from 1 to 18 mgm. per 100 c.cm., and the therapeutic action appeared to be as good in patients with a low concentration as in those with a high concentration. The findings of these workers are conflicting with clinical experience, and further research is necessary before the action of the drug is clearly understood.

Age incidence

Table II gives the age incidence of 100 cases treated with M. & B. 693, and 164 untreated cases; about 70 per cent of cases in both groups were aged between 20 and 40.

TABLE II
Age incidence

Age	Under 20	20-29	30-39	40-49	Over 49
Number of cases treated with M. & B. 693.	2	44	32	16	6
Number of cases not treated with M. & B. 693.	7	75	45	27	10

Type

Typing of the pneumococci was attempted in all cases in which sputum was expectorated. Unfortunately the only types of antipneumococcal sera available were I and II; the findings in this respect are therefore incomplete. The direct typing method was used in all cases; of 85 sputa examined, type I pneumococcus was found in 18, type II in 6, and 61 were unclassified.

Day of disease on admission

Table III gives the day of disease on admission of the treated and untreated cases. Fifty-six per cent of the treated cases and 39 per cent of the untreated cases were admitted on the second or third day of the illness.

TABLE III
Day of disease on admission

Day	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Number of cases treated with M. & B. 693.	1	17	39	18	11	5	2	3	2	2
Number of cases not treated with M. & B. 693.	0	19	45	56	18	12	7	2	3	2

The response to treatment

The response to treatment was classified as 'dramatic' (7 per cent), when a crisis took place within twenty-four hours in severely ill patients; 'excellent' (61 per cent) in all cases resolving within forty-eight hours; 'good' (13 per cent) either when a response was apparent after forty-eight hours, or when a sustained pyrexia (without toxæmia) recurred after an early primary fall in temperature; 'indefinite' (3 per cent); and 'none' (16 per cent). The last two terms are self-explanatory.

Table IV shows the day of treatment on which the temperature fell to normal.

Seventy per cent of cases ended in a 'crisis' during the first and second days of treatment. Most patients were admitted at midday and the

treatment was not instituted until the early afternoon. The fall in temperature in these

TABLE IV

Day of treatment on which the temperature fell to normal

Day	1st	2nd	3rd	4th	5th	6th	7th	Drug stopped	Deaths
Number of cases	9	61	9	2	4	2	3	5	5

cases, therefore, took place within thirty-six hours of the beginning of treatment. Coincident with the fall of temperature, there was usually a fall in the pulse and respiration rates and a pronounced improvement in the general condition. The 'crisis' appeared to be as dramatic as the normal crisis in lobar pneumonia. In some 20 per cent of these cases there was a 12 to 18 hours' lag in the fall of the pulse and respirations, and a delay in the disappearance of the toxæmia.

In 16 per cent of all cases a secondary pyrexia lasting 1 to 7 days occurred. No sign of spread of disease was found and toxæmia was absent (figure 2). This phenomenon has also been described by Evans and Gaisford (*loc. cit.*) and by Anderson (*loc. cit.*); it was found to have no clinical significance. Occasionally a relapse occurred 6 to 12 hours after an apparent response (figure 3), seeming as though the scales were weighed just in favour of the invading

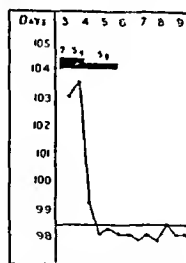


Fig. 1 (case 63).—Excellent response on 2nd day of M. & B. 693 (4th day of disease). Total M. & B. 693 given was 12.5 gm.

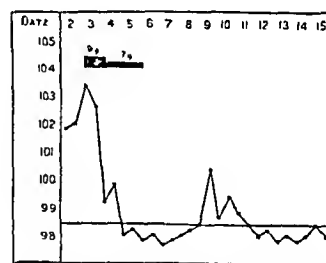


Fig. 2 (case 82).—Excellent response on 2nd day of M. & B. 693 (4th day of disease). Total M. & B. 693 given was 16 gm.

organism. Continuation of M. & B. 693 in increased doses sometimes resulted in a permanent fall in temperature, pulse and respiration rates, but more often there was no noticeable effect. The disease spread in 9 cases including 3 which ended fatally. The 3 cases classified as 'indefinite' were all severely ill; in 2 the temperature fell to normal in five days, and in 1, four days after the commencement of treatment. The 16 cases which did not respond included the 5 deaths. Figures 1, 2, 3 and 4 are specimen temperature charts.

Mortality rate

The mortality rate was 5 per cent. The following 5 cases ended fatally :—

Case 14.—Hospital compounder, *æt.* 49. Chronic alcoholic. Diabetic. Hyperpietic (blood pressure 190/100). Whilst on leave, developed a febrile illness with cough. Treated himself with quinine for malaria. Travelled 200 miles, and arrived at the Kolar Gold Fields Hospital on the 8th day of his illness. He was gravely ill, temperature 102, pulse 130, and respiration 50. Consolidation of left upper and lower lobes and right lower lobe. Sputum rusty, type indefinite. White blood count 15,000, polymorphs 76 per cent, large mononuclears 6 per cent, lymphocytes 18 per cent, eosinophiles 0 per cent. He was given M. & B. 693 3 tablets *t.d.s.* for 4 days (22.5 gm.), and insulin 20 units *b.d.* There was no improvement, persistent hiccups developed and the drug was stopped. The pyrexia persisted, and on the 8th day of admission (15th day of disease), M. & B. 693 was again exhibited, 3 tablets

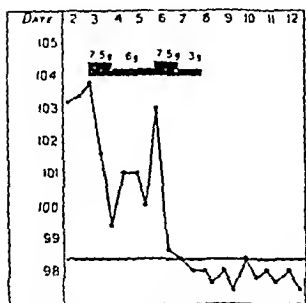


Fig. 3 (case 67).—Apparent response in 24 hours followed by a relapse. Crisis on 4th day of M. & B. 693 (6th day of disease). Response classified as 'indefinite'. Total M. & B. 693 given was 24 gm.

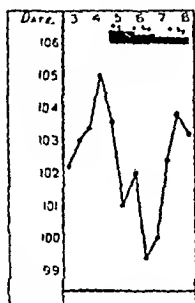


Fig. 4 (case 85).—Apparent response in 36 hours. Relapse. Death. Total M. & B. 693 given was 18.5 gm.

q.q.h. for 24 hours then 3 *t.d.s.* for 7 days. White blood count 16,000, polymorphs 77 per cent, large mononuclears 3 per cent, lymphocytes 20 per cent, and eosinophiles 0 per cent. On the 11th day of admission there were signs of spread to right upper lobe, and the following day 10 c.cm. of slightly opalescent fluid was aspirated from the right base. The fluid contained pus cells and yielded a pure culture of *S. pneumoniae*. The drug was stopped on the 11th day; total given was 49.5 gm. The patient steadily went down hill and died on the 31st day of disease (24th day of admission).

Case 37.—Underground coolie, *æt.* 45. Admitted on 8th day of disease. General condition extremely poor. Temperature 102, pulse 140, and respiration 60. Consolidation of left lower lobe. Sputum rusty, type I pneumococcus. M. & B. 693 3 tablets *q.q.h.* for twenty-four hours was given, then 2 *t.d.s.* until death ensued. There was an early temporary improvement, but on the 4th day of admission (11th day of disease) there were signs of spread of disease to the right lower lobe. The general condition deteriorated and the patient died seven days after admission to hospital (14th day of disease). Total M. & B. 693 given over a period of seven days was 22 gm.

Case 43.—Underground coolie, *æt.* 30. The patient was too ill on admission to give a lucid history, illness began 7.5 days previously. Temperature 101, pulse 140, and respiration 60. Consolidation left upper lobe and generalized rhonchi throughout both lungs. Sputum not expectorated. M. & B. 693 3 tablets *q.q.h.* was given for twenty-four hours, then 2 *t.d.s.* for thirty-six hours. Total 13.5 gm. Death took place 60 hours after admission.

Case 62.—Underground coolie, *æt.* 23. Admitted on 3rd day of disease. General condition fair. Temperature 103, pulse 110, and respiration 40. Consolidation

left lower lobe. Sputum rusty, type I. M. & B. 693 3 tablets *q.q.h.* given for twenty-four hours then 2 *t.d.s.* for two days. Condition worse on 4th day of admission (6th day of disease), and signs of spread of disease to left upper lobe. White blood count 12,000, polymorphonuclears 72 per cent, large mononuclears 3 per cent, lymphocytes 26 per cent, eosinophiles 0 per cent. Dose M. & B. 693 increased to 3 *q.q.h.* for twenty-four hours, then 2 *t.d.s.* until the patient died on the 7th day of admission (9th day of disease). Total M. & B. 693 given over a period of seven days was 28.5 gm.

Case 85.—Underground coolie, *æt.* 22. Admitted on 3rd day of disease. First seen by me on 5th day of disease. General condition poor. Temperature 105, pulse 130, and respiration 50. Consolidation left upper and lower lobes and right lower lobe. Sputum rusty, type indefinite. M. & B. 693 3 tablets *q.q.h.* given for twenty-four hours, then 3 *t.d.s.* for twenty-four hours and 2 *t.d.s.* for two days. Total 18.5 gm. in four days. There was a fall of temperature within 48 hours from 105 to 99.6, but no corresponding fall in pulse rate. The following day the temperature rose to 102.4, the patient became delirious and died on the 4th day of treatment (8th day of disease) (figure 4).

A fatal termination was expected in cases 14, 37 and 43. Case 14 was a chronic alcoholic and diabetic, and was admitted on the 8th day of his illness, there was in addition the complication of a staphylococcal pleural effusion. He was one of the first sixteen cases to be treated, and the initial dose may have been too small. Case 37 was admitted on the 8th day of the disease and was severely ill. Case 43 was moribund on admission and was expected to die within a few hours. The lack of response in cases 62 and 85 was disappointing. Case 62 was admitted on the third day of the disease and his general condition gave no cause for anxiety. The dose of the drug was adequate, and there was no vomiting. Case 85 gave an early response which unfortunately was not maintained.

It is interesting to note that of the 5 cases, type I pneumococcus was found in the sputum in 2 cases. The type was unclassified in 2 cases and sputum was not expectorated in 1 case.

Post-mortem examination was refused in all cases.

Toxic symptoms

The absence of severe toxic symptoms was impressive, even when large doses of the drug were administered. Case 76 received 82 gm. over a period of 27 days without any untoward effects. Nausea and vomiting were the only common symptoms and occurred in 17 cases, but were never severe enough to indicate withdrawal of the drug. When vomiting occurred the dose was repeated, and in almost all cases the drug was retained. One case complained of abdominal pain, and in 4 cases (all severely ill) a confused mental state, persisting for 1 to 2 days after the crisis, was observed. Repeated differential white blood counts were done in 10 cases, and no tendency to granulocytopenia was apparent. Spectroscopic examination of the blood for methæmoglobinæmia and sulphæmoglobinæmia was not attempted. Severe cyanosis was not seen, but it is realized that mild degrees in a dark-skinned person can easily be missed.

(An interesting symptom observed in a patient treated for gonorrhoea was the appearance of dysarthria after the patient had taken 12 gm. of M. & B. 693 in 3 days. The drug was stopped and the speech became normal in 48 hours.)

Complications

Case 14 developed a staphylococcal pleural effusion; the patient ultimately died. This was the only complication in the series. In the control series of 164 cases, the following complications occurred: 3 unresolved pneumonias, 1 sterile effusion, 1 lung abscess, and 1 pneumococcal peritonitis.

Comparison of results

The mortality rate of 5 per cent in the 100 treated cases compares favourably with 18.8 per cent in the 164 cases treated without M. & B. 693. Reference to table V, which gives the day of disease on which the temperature became normal, shows as striking a difference. In the treated cases, 76 per cent became afebrile before the 8th day of the disease, compared with 10.5 per cent in the untreated cases. The contrast is graphically represented in figure 5.

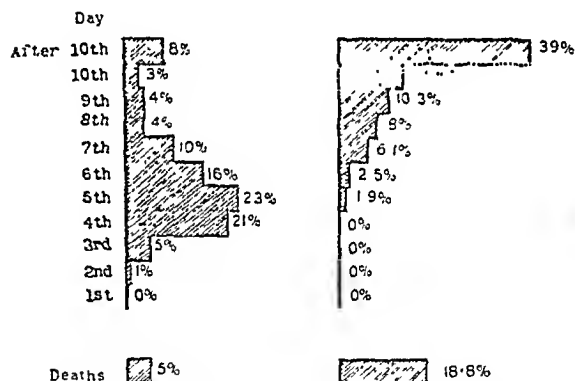


Fig. 5.—Day of disease on which the temperature fell to normal. (Graphic representation.)

Cases treated with M. & B. 693. Cases not treated with M. & B. 693.

TABLE V

Day of disease on which temperature became normal

Day	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	After 10th
Number of cases treated with M. & B. 693	0	1	5	21	23	16	10	4	4	3	8
Number of cases not treated with M. & B. 693	0	0	0	0	3	4	10	13	17	22	64

Complications were less common in the treated cases, 1 per cent compared with 3.6 per cent. The routine procedure before the introduction of M. & B. 693 was complete rest in bed for 14

days after the patient became afebrile, discharge from hospital 5 to 6 days later, then 1 month's sick leave before resumption of duty. The uncomplicated cases were therefore off duty for 7 to 8 weeks. The relatively mild course, and more rapid convalescence of patients treated with M. & B. 693, enabled this period to be shortened appreciably. The duration of stay in hospital for the average case treated with M. & B. 693 was reduced to 12 to 18 days, the sick leave to 2 weeks, and the period of off duty to about 4 weeks (a saving of at least 3 weeks).

Conclusions

It is too soon to dogmatize as to the value of M. & B. 693 in the treatment of lobar pneumonia. Comparatively few cases have been treated, and the drug must still be considered to be under trial. The experience gathered in this series, in addition to reports published up to date, encourages the prediction of an optimistic future for the treatment of lobar pneumonia. The response to M. & B. 693 in the majority of cases is most impressive. The mortality rate in all published reports is well below 10 per cent. A crisis usually occurs many hours or even days earlier than would normally be expected. A fall of temperature to normal within 48 hours of the beginning of treatment is seen in about 80 per cent of cases. Clinical experience indicates that an adequate initial dosage is essential and that if no signs of response appear by the third day of treatment, it is questionable whether the drug should be continued.

A small proportion of cases do not respond (16 per cent in the present series), the reason for the absence of response will only be known when the action of the drug is fully understood. It is worth noting that of the 16 failures, 6 were type I (37.5 per cent). Maclean *et al.* (1939) in an important recent paper showed that there are great differences in the sensitivity of the pneumococcus to M. & B. 693, independent of the type. These workers also produced experimental evidence in mice, of the synergic action of pneumococcal vaccine and M. & B. 693. In some of the failures in the present series, it was felt that an adjuvant to M. & B. 693 might well have tilted the scales in favour of the patient. Barach (1931) has shown that large doses of pneumococcal vaccine can be administered to patients suffering from lobar pneumonia, without any risk, and that the presence of immune bodies in the blood can be demonstrated after 3 to 4 days. A combination of polyvalent pneumococcal vaccine and M. & B. 693 may be worthy of a trial in selected cases.

Summary

1. The results of the treatment of 100 cases of lobar pneumonia with M. & B. 693, admitted to the Kolar Gold Fields Hospital between November 1938 and March 1939, are discussed.

(Continued at foot of next page)

TREATMENT OF NERVOUS DISEASES BY VITAMIN B₁ WITH SPECIAL REFERENCE TO TRIGEMINAL NEURALGIA

(A REPORT OF 7 CASES)

By I. BAKHSH, M.D. (Lond.), M.R.C.P. (Lond.)
MAJOR, I.M.S.

Professor of Pharmacology and Therapeutics, K. J. Medical College, and Physician to Out-Patients Department, Mayo Hospital, Lahore

VITAMIN-B therapy of nervous diseases dates back to 1897, when Eijkman discovered that the feeding of chicks with polished rice produced symptoms resembling beri-beri in man. Beri-beri was from now onward treated successfully with crude preparations of vitamin B from rice husks, etc. In 1927, Jansen and Donath isolated from rice husks vitamin B₁ in a pure and crystalline form which could be used parenterally with consequent increase in its therapeutic efficiency.

During the last decade a good deal of work has been done on the absorption, fate and utilization of this important vitamin and its therapeutic claims have been extended to other forms of polyneuritis. It has been suggested that the various forms of polyneuritis are due to vitamin-B₁ deficiency and differ from beri-beri only in the particular mechanism by which the deficiency is brought about and include alcoholic polyneuritis, polyneuritis of pregnancy, post-infective polyneuritis, polyneuritis as a result of gastro-intestinal disease, and even diabetic, arsenic and lead polyneuritis.

Recently, great emphasis has been laid on the various ways in which vitamin-B₁ deficiency is

(Continued from previous page)

2. The mortality rate was 5 per cent.

3. The temperature fell to normal within thirty-six hours of the beginning of treatment in 70 per cent of cases.

4. Seventy-six per cent became apyrexial before the eighth day of the disease.

I wish to acknowledge my thanks to the managers of the Kolar Gold Fields, Messrs. John Taylor and Sons, 6, Queen Street Place, London, E.C.4, for their permission to publish this paper, and to the Chief Medical Officer, Dr. W. B. Roantree, for his valuable criticisms.

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caused, and rightly so, for success in therapeutics depends largely on the exact knowledge of the causative factor. Avitaminosis B₁ may be due to one or more of the following causes:—

(1) Insufficient intake due either to extreme poverty but more often to ignorance and food faddism, various forms of anorexias either functional or as a result of drug addiction and heavy smoking, persistent vomiting of pregnancy, and pyloric stenosis. Beri-beri has recently been described in anorexia nervosa.

(2) Defective absorption due to functional or organic lesions of the digestive tract, especially alcoholic gastro-enteritis, sprue, persistent ill and other diarrhoeas, chronic dysenteries, intestinal tuberculosis, gastro-colic fistula and pellagra.

(3) Increased requirements. Cowgill (1938) has shown that vitamin requirements of man are directly proportional to body-weight, caloric intake, and metabolism. Beri-beri is more common in those countries where the staple diet consists mainly of polished rice which has high caloric but low vitamin value, infections, excessive physical exertion, thyrotoxicosis and pregnancy, by raising the body metabolism, often help to precipitate the acute symptoms of B₁ deficiency.

It is very rare that a single factor is the cause of vitamin-B₁ deficiency. For example, alcoholic polyneuritis results not only from insufficient intake and defective absorption due to gastro-enteritis but is due also to the high caloric value of alcohol. Similarly in pregnancy there is greater demand due to increased metabolism and extra requirements by the foetus and at the same time there is inadequate intake as a result of vomiting.

Vitamin B₁ being water soluble is not stored in the body hence symptoms of deprivation appear much earlier than in the case of fat soluble vitamins A, D and E. Again deficiency of vitamin B₁ is very rarely single; the factors which cause B₁ deficiency may also produce lack of other vitamins as well as iron, calcium and phosphorus. For instance, in chronic lead poisoning in addition to the nervous signs there is not infrequently parodontosis and finally loss of teeth due to a vitamin-A deficiency and the severe calf pains due to hæmorrhages as a result of vitamin-C deficiency. It is not very unusual to find beri-beri associated with pellagra in chronic alcoholics. These points are of great practical importance in successful therapy of not only vitamin B₁ but also of other vitamin deficiencies.

Vitamin-B therapy.—Vitamin B₁ has been used in a variety of nervous disorders with brilliant results in some cases but equally disappointing ones in others. It is too early to remark about the future of vitamin B₁ in the various diseases of the nervous system and the clinical data at present available is too scanty to indicate B₁ therapy in all such diseases. The variability of success is due to many causes.

Firstly, we possess no reliable test for estimating B₁ deficiency and secondly there is no consensus of opinion about adequate dosage. Again the changes produced by deficiency of vitamins which are only biochemical and functional in the beginning become structural later and any structural change in the case of nervous tissue is extremely difficult to repair.

In addition to the various forms of polyneuritis, vitamin B₁ has been advocated for the treatment of neuralgias and affections of the brain and spinal cord, such as subacute combined degeneration, disseminated sclerosis, tabes dorsalis, and amyotrophic lateral sclerosis. Encouraging results have been obtained by some with large doses of vitamin B₁ in these cases and recently Metildi (1939) has reported complete or partial relief in six cases suffering from tabetic pains which were unaffected by antisiphilitic treatment.

I have used vitamin B₁ in doses of 10 mg. daily in a case of early disseminated sclerosis for over one month without the slightest improvement. In another case of diabetic polyneuritis, oral and parenteral administration of 10 to 20 mg. of B₁ without insulin for one month produced no effect on the sensory changes, in fact the patient complained of exaggeration of tingling and burning sensations in the hands and feet. When his urine became sugar-free after insulin therapy he was relieved within a few days. Two cases of arsenical neuritis were uninfluenced by prolonged vitamin-B₁ therapy, although similar dosage in four cases of polyneuritis of unknown origin produced satisfactory results and the improvement was noticeable in the first week of treatment. One case of nerve deafness did not respond to six weeks of B₁ treatment given by mouth as well by injection.

In 1936, Böhm treated two cases of trigeminal neuralgia with injections of crystalline vitamin B₁ (Betaxin) with complete success. In the case of a female 41 years old, dental treatment and alcohol injections had already been tried without any effect. She was given one injection of 'Betaxin' daily. Improvement was noticeable after the fourth injection and was complete after the seventh injection. The second case required 14 injections.

In the same year Hofer von Lobenstein (1936) tried vitamin B₁ in one case each of neuralgia, of the trigeminal, occipital and intercostal nerves, and in two cases of sciatica. He gave 6 to 10 intramuscular injections with satisfactory results in all.

Molnar (1937) also described a case of trigeminal neuralgia in a female 51 years of age, in whom all previous treatment was without any effect. She received daily injections of vitamin B₁ for 16 days and left hospital without symptoms. After some time pain returned but was not so bad.

Last year I requested Lieut.-Colonel V. R. Mirajkar, Professor of Surgery, K. E. Medical

College, Lahore, to let me treat a case of trigeminal neuralgia which had come to him for alcohol injection. Vitamin-B₁ therapy in this case was so successful that Colonel Mirajkar afterwards referred all his cases of trigeminal neuralgia to me. So far seven cases have been treated and with the exception of one all have been greatly benefited by this treatment. None of the six cases have so far relapsed. In none of these cases was any other treatment, such as removal of carious teeth, given.

Case 1, male, aged 66, complained of paroxysms of severe pain on the left side of the face on talking, eating and drinking. Duration 2½ years. Moderate addiction to opium for the last 20 years. Physical examination showed a well-nourished individual with majority of teeth carious, some having already been removed. Removal of teeth had no effect on the neuralgia. All three branches of the nerve affected. Treated with intramuscular injections of 30 mgm. of B₁ daily for the first two days and then 10 mgm. daily for another ten days. Slight but definite improvement was noticed after the first 48 hours of treatment and after one week the patient was completely free from pain. Total dosage 160 mgm.

Case 2, male, 44 years. Complained of paroxysms of severe pain on the right side of the face; duration 11 months: general nutrition good. Teeth although sound had been removed on the advice of the patient's physician. All the three branches of 5th nerve involved. Given 30 mgm. of B₁ daily by intramuscular injections for one week. Improvement commenced within 48 hours and was complete after five days. Total dosage = 210 mgm.

Case 3, male 65 years. History of 12 years of neuralgic pain on the left side of the face. For the first five years the pain was moderate in intensity but later became more acute. General nutrition fair. All the teeth on the left side had been extracted, those of the right side were apparently normal. All the three branches of the 5th nerve involved. Given 6 mgm. of B₁ intramuscularly daily. After two weeks' treatment was relieved by 50 per cent but had to give up treatment on account of urgent family affairs. Total dosage = 84 mgm.

Case 4, male, 60 years. Three months earlier had a gumboil on the right side which was incised, but the pain had persisted. Lately it had become intolerable and came on when eating, drinking and even speaking. General nutrition good. All teeth on the affected side had been removed. All the branches of 5th nerve involved. Given intramuscularly B₁ in 6 mgm. doses daily for two weeks. Improvement commenced within the first week and was complete after the tenth injection. Total dosage = 84 mgm.

Case 5, male, 60 years. Four years' history of neuralgic pains on the right side of the face and scalp, attacks came on while eating, drinking and talking. The pain usually started first in the scalp and then spread downwards till it involved the whole of the right side of the face. General nutrition good. All the teeth on the right side except one premolar and two canines in the lower jaw had been extracted, most of the teeth on the left side were carious. Right side showed slight wasting but sensations were intact. Given 10 mgm. of B₁ daily by intramuscular injections. On the fourth day of treatment felt a good deal of relief in the severity and frequency of paroxysms but next day had recurrence of pain and could not sleep at night. After the 7th injection he started improving again. After the 10th injection he was benefited by 30 per cent but two further injections had no more effect and the treatment was abandoned. Total dosage = 120 mgm.

Case 6.—M. D., aged 65 years. He suffered from severe neuralgic pains on the right side of the face for the last six years. He had eight injections of alcohol, each injection giving him relief for three months

and the last one for one year. Now the attacks were more frequent and the pain was worse.

Treated with 10 mgm. of B_1 given intramuscularly every day. There was complete relief after the sixth injection but the pain recurred by 25 per cent after the ninth injection. Vitamin treatment was stopped and he was given potassium bromide gr. 5 and luminal gr. $\frac{1}{2}$ twice daily instead. After one week he again got complete relief and has remained well since. Total dosage = 90 mgm.

Case 7.—N. A., aged 25 years. Six years' history of neuralgic pain confined to the distribution of the right 5th nerve. Stated that he had suffered from gonorrhœa and syphilis seven years before but the Wassermann reaction was negative. Examination showed fair nutrition, all the three branches of the 5th nerve were involved and there was watering of the right eye and right side of the nose. There was very slight wasting of the right side of the face but the sensations were intact. Was given an alcohol injection one year before which gave him complete relief for nearly eleven months. Teeth normal. Given B_1 by intramuscular injections in doses of 10 mgm. daily for seven days but there was no relief. Total dosage = 70 mgm.

Discussion

The above account of seven cases of trigeminal neuralgia shows that only one case did not respond to vitamin- B_1 therapy. This patient gave a history of syphilis and although the Wassermann reaction was negative he was given a course of mercury and iodides by mouth without any relief. Of the six cases which responded to treatment four got 100 per cent relief, one about 50 per cent and one about 30 per cent. Case 3, who obtained about 50 per cent relief, received 84 mgm. of B_1 and case 5 who improved by about 30 per cent received 120 mgm. The four cases which were completely relieved received 160, 210, 84 and 90 mgm. each and in all of them improvement commenced promptly and in two cases was complete when only 50 mgm. of the vitamin had been given, although treatment was continued for a few days more. It is difficult to say whether prolonged treatment with perhaps bigger doses would have benefited cases 3 and 5 any more.

It is generally believed that vitamin B_1 even when given in enormous doses does not cause any toxic symptoms and Weiss and Wilkins (1937) have given 100 mgm. of crystalline B_1 intravenously without any ill effects. However, recently Steinberg (1938) has reported untoward effects from using large doses of vitamin B_1 . In three of his patients herpes zoster occurred after large doses and in one case he was able to produce herpes on two successive occasions. Steinberg believes that vitamin B_1 when given in large doses is capable of irritating the peripheral nerve plates. In the case of diabetic polyneuritis above referred to there was definite worsening of burning and tingling sensations in the hands and feet after continued use of moderate doses of vitamin B_1 . In case 6 the recurrence of neuralgic pains might be due to the irritant action of B_1 on the sensory nerve endings as the patient was relieved when the

(Continued at foot of next column)

INFECTION WITH *GIARDIA LAMBLIA*—ITS PATHOGENICITY AND TREATMENT

By R. N. CHOPRA, C.I.E., K.H.P., M.A., M.D.,
Sc.D. (Cantab.), F.R.C.P. (Lond.)

BREVET-COLONEL, I.M.S.

B. M. DAS GUPTA

B. SEN, B.Sc., M.B.

and

Z. AHMED, M.B., D.P.H.

(From the School of Tropical Medicine, Calcutta)

Giardia lamblia is a common parasitic intestinal flagellate. With regard to its geographical distribution, this is now known to be world-wide.

(Continued from previous column)

injections were stopped and bromides and luminal were given instead.

Conclusions

Vitamin B_1 is proving to be of great therapeutic value in many diseases of the nervous system for which there was no satisfactory remedy before. The clinical data are too scanty to evaluate its efficacy in all the diseases for which it is advocated but it seems to be of particular value in many forms of polyneuritis. Whether the action of vitamin B_1 is due to its replacing any deficiency or to some other action is not quite clear yet.

In a short series of seven cases of trigeminal neuralgia injections of B_1 have given complete relief in four and partial relief in the other two, while one was unaffected. The relief obtained was dramatic in all the four cases and considering that trigeminal neuralgia is a difficult disease to treat without operation, which in itself is a definite surgical risk, vitamin B_1 promises to be of considerable therapeutic value and should be given a trial in all cases of trigeminal neuralgia.

My thanks are due to Lieut.-Colonel V. R. Mirajkar, O.B.E., I.M.S., for permission to treat his cases and to my assistant demonstrator Dr. Abdul Qayyum Malik, M.B., B.S., for his great help. I am also indebted to Messrs. Merck & Co. and Hoffmann-La Roche & Co. for supplying me with their products 'Betabion' and 'Benerva' respectively.

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The incidence in the tropics is certainly higher than in the temperate zones. The following table gives the incidence of infection with *Giardia lamblia* among the patients treated for various diseases at the Carmichael Hospital for Tropical Diseases and in the out-patient department of the School of Tropical Medicine, for four years.

Giardia lamblia inhabits the lumen of the small intestine, the duodenum being the commonest site of infection. On this account the

TABLE

	Total number of stools examined	Number showing infection with <i>Giardia lamblia</i>	Incidence, per cent
1934 ..	4,302	246	5.8
1936 ..	5,498	380	6.8
1937 ..	4,766	226	4.7
1938 ..	4,710	357	7.6

motile forms are not usually seen in the stool; but when the patient has diarrhoea, the contents of the small intestine are passed down rapidly and it is then that the active phase of the parasite is encountered in the stool. Encystation takes place in the large bowel and in most cases diagnosis of the infection with *Giardia* is made by finding the cysts in the stool. Excretion of the cysts in the faeces is markedly intermittent so that care should be taken in drawing conclusions as to the effectiveness of any drug administered.

A host of drugs, e.g., treparsol, stovarsol, carbarsone, bistovol, bismuth subgallate, neosalvarsan, yatren, etc., have been used by various workers in cases of infection with *Giardia* but without any appreciable success. We have tried stovarsol, carbarsone and yatren in many cases, the majority of which did not respond to the treatments. In a few instances, however, the parasites disappeared after the treatment. But as the patients were not kept under observation for a reasonable period after the treatment had been discontinued, it is difficult to state with certainty that the infection was completely eradicated, for *Giardia*, as we have said before, reappears in the stool after absence for several days. Recently, Brumpt (1937) conducted experiments on lamblia-infected mice and has noted that, of all the treatments tested, oral administration of one per cent solution of quinacrine (a French equivalent of atebirin) for 5 days was able to bring about a cure in 80 per cent of the animals to which it was administered. Martin (1937) claims that atebirin in the doses employed for the treatment of malaria will rid the majority of patients of lamblasis of their flagellates. In a

few cases it may be necessary to repeat the course. In view of the striking results obtained with atebirin, as reported above, we have tried this drug on a number of cases using the same dose as for the treatment of malaria but have considered in this paper only those few cases which could be kept under observation for at least six weeks after the completion of treatment.

Case notes

Case 1.—Mrs. B. has been suffering from looseness of bowels and flatulence for the past two years. Stools examined in January last showed a heavy infection with *Giardia lamblia* (trophozoites and cysts) and *Trichomonas*. She was then treated with stovarsol and bismuth. There was a temporary amelioration of symptoms. No further examinations were possible at the time. On 2nd April, 1939, the symptoms recurred and the stools were full of *Giardia* cysts, *Trichomonas*, *Chilomastix* and a few *Enteromonas*. Besides, there were scanty *E. histolytica* and *E. coli* cysts. She was immediately put on to atebirin (one tablet three times a day for 5 days). Stools were examined daily during treatment and on the 7th, 11th, 15th, 18th, 24th, 30th and 36th day after the treatment had been completed. *Giardia* disappeared after 6 doses of atebirin and were not found any time during these examinations. But all the other flagellates and the amœbæ remained unaffected. A course of emetine injections, however, brought about the disappearance of *E. histolytica* from the stool.

Case 2.—D. C. complained of long-standing diarrhoea alternating with constipation and abdominal discomfort, especially after food. Stools positive for *Giardia* cysts (heavy infection). Put on to atebirin. Stools were examined daily during treatment and on the 7th, 13th, 20th, 29th and 32nd day after treatment. Administration of 5 tablets only, caused the disappearance of the flagellate from the stool. Stools were also plated on McConkey's lactose neutral-red agar but no non-lactose fermenters were isolated. Diarrhoea stopped and the patient's health gradually improved.

Case 3.—M. B. A child of 8 years. There is a history of the passage of voluminous stools containing large quantities of mucus for nearly 4 months. Marked emaciation and tumidity of abdomen. Stools showing large number of *Giardia lamblia* (chiefly trophozoites). Atebrin was given in proportionate doses. There was rapid disappearance of the parasite. After 3 doses very scanty parasites were found and after the 4th not a single flagellate could be discovered in spite of prolonged search. Repeated examinations during and after treatment for two months failed to show the flagellate in the stools. Symptoms disappeared and the patient's general condition greatly improved. Three samples of stools were plated for pathogenic bacteria, one gave a culture of *B. pseudocolinus*. But no importance was attached to this finding as the patient showed marked improvement on atebirin.

Case 4.—A. R. A case of oriental sore. There is no history of any intestinal disturbance. Stools positive for *Giardia* and *E. coli* cysts. Put on atebirin. Stools were examined every day during treatment and on the 4th, 15th, 22nd and the 30th day after treatment. *Giardia* disappeared after 9 tablets had been taken. The drug had no effect on *E. coli*.

Case 5.—M. D. A long-standing case of *Giardia* infection. Occasional attacks of diarrhoea accompanied by pain about the umbilicus. There is marked flatulence; stools showed a good number of the encysted flagellates. Proved refractory to stovarsol and bismuth. Put on to atebirin which brought about a rapid disappearance of the parasites from the stool. Repeated examinations (three times during and nine times after treatment) failed to reveal the parasites. There was definite improvement of the patient's condition with the eradication of the parasites.

Case 6.—B. D. A girl of 18, suffering from asthma associated with abdominal symptoms. Stools showed the cysts of *Giardia lamblia* and *Entamoeba histolytica*, was treated with atebirin, followed by a course of carbarsone. Both the infections were eradicated. Six consecutive examinations after the completion of atebirin and carbarsone treatments were negative for both *Giardia* and amoeba. Although the patient's general health improved and abdominal symptoms passed off, she was not cured of asthma.

Case 7.—P. B. The patient is a railway doctor. Was suffering from giant urticaria for a month and a half. The stool showed a heavy infection with *Giardia*. There was no history of any intestinal trouble. Five tablets of atebirin caused the disappearance of the flagellate from the stool. The patient felt that after he had received a full course of atebirin treatment the severity of the urticarial eruptions was lessened. Examination of stools were carried out at weekly intervals, the last being done 29 days after the completion of the treatment. All these specimens were negative for *Giardia*.

Case 8.—K., aged 2½ years. History of persistent diarrhoea. Was treated with 'Inteste Phage' (A. F. D.), castor oil emulsion, bismuth with salol, etc., but to no purpose. Stools showed a large number of *Giardia*, chiefly trophozoites. At once put on to atebirin. After 3 days' treatment the parasites disappeared from the stool and diarrhoea stopped. Stools were examined 23 times after treatment, but they were invariably negative.

Case 9.—R. C. A case of chronic malaria (benign tertian) with enlarged spleen. No history of any recent bowel disorders. Stools positive for *Giardia* cysts. A course of atebirin caused the disappearance of the parasites from the stool. As daily specimens were not available it was not possible to state after how many doses of atebirin the parasites had disappeared. Several examinations after treatment failed to show the parasites.

Case 10.—T. M. History of recurrent diarrhoea and pain in the abdomen for two years. All six serial examinations of stools showed the cysts of *Giardia* in large numbers. Atebrin was given. Several examinations after a full course of atebirin had been taken were carried out covering a period of a month and a half. On no occasion was the flagellate ever found. The patient's condition improved very definitely after treatment.

Remarks.—It will appear from the foregoing that the parasites in all cases disappeared after the administration of 9 tablets of atebirin as a maximum. These cases were kept under observation for a minimum period of six weeks after the treatment had been discontinued. During and after this observation period the stools, examined several times, were invariably negative for *Giardia*. In a case of very long duration and showing large numbers of the parasites in the stools the infection was eradicated with remarkable rapidity (case 3). Some cases showed a mixed infection with flagellates of other genera and amoebae (cases 1, 4 and 6). Atebrin does not seem to affect these flagellates, e.g., *Trichomonas*, *Chilomastix* and *Enteromonas*. Nor has it any action on *Entamoeba histolytica* or *Entamoeba coli*. The question of pathogenicity or otherwise of *Giardia lamblia* is still awaiting solution. Some observers consider that, like other intestinal flagellates, this parasite is also a harmless organism. Their contention is that the infection—and often a heavy one—is frequently found in perfectly healthy individuals

and not associated with any symptoms. Further, *Giardia* infections are very common in animals, e.g., quite a large proportion of rats and mice harbour *Giardia muris* and in such animals no lesions of the gut are to be discovered. It lives in the fluid contents of the gut and does not possess the power of invading tissues. Others who lay claim to its pathogenicity argue that the mere fact that *Giardia* infection can be seen in healthy persons does not prove its non-pathogenicity, for quite a large number of apparently healthy individuals harbour *E. histolytica* infection. As a result of their clinical observations they are inclined to hold that *Giardia* often causes diarrhoea alternating with constipation, abdominal pain, flatulence, etc. Children are the worst sufferers; in them there may be intractable diarrhoea associated with the passage of large quantities of mucus and impairment of growth as a result of chronic indigestion. Some observers even go so far as to incriminate this flagellate as the cause of cholecystitis, although they cannot furnish any satisfactory evidence to show that the flagellate can spread from the duodenum to the gall bladder. In our series of 10 cases 3 had no intestinal disturbance, 2 had associated *E. histolytica* infection, and the abdominal symptoms complained of by them may be attributed to this. In the remaining cases repeated examinations showed no other abnormality than a heavy infection with *Giardia* and their symptoms ameliorated or disappeared with the eradication of the infection. In the circumstances it is not perhaps unreasonable to assume that *Giardia* infection was the cause of the symptoms in these cases.

Summary

Ten cases of infection with *Giardia lamblia* have been treated with atebirin using the same dose as for the treatment of malaria. Administration of 9 tablets as a maximum brought about the disappearance of the parasites from the stool in every case. Repeated examinations of the stools after treatment up to six weeks or more failed to show the parasite. Although atebirin has proved invaluable for the eradication of *Giardia* infection, it does not possess any action on other flagellates of the intestine, e.g., *Chilomastix*, *Trichomonas* and *Enteromonas*. Nor does it affect *Entamoeba histolytica* or *Entamoeba coli*. The question of the pathogenicity of *Giardia* is discussed and the authors are inclined to the view that in some cases at least infection with *Giardia lamblia* is responsible for intestinal disturbances, especially in children.

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DIFFICULTIES AND DANGERS IN PROVIDING DONORS OF BLOOD

By S. D. S. GREVAL

LIEUTENANT-COLONEL, I.M.S.

Imperial Serologist, Government of India,

and

S. N. CHANDRA

CAPTAIN (late I.M.S.)

First Assistant

(Imperial Serologist's Laboratory, The School of Tropical Medicine, Calcutta)

THIS communication is published in the interest of the newly established or proposed depôts for blood transfusion, which are being organized in several Provinces in India by the Provincial Red Cross Societies or other bodies. A blood transfusion service has been run for Calcutta from this laboratory for the last 15 years.

The accompanying diagram explains the serological constitution of blood groups and blood types, and gives the equivalents of O, A, B and AB in the old terminology which should now be forgotten.

I. Donors of the same group yet incompatible

1. *Abnormal constituent in the serum due to a morbid state.*—Lloyd and Chandra (1933) recorded an AB recipient whose serum agglutinated red blood cells of AB subjects, A subjects and B subjects. There was an urgent need for transfusion of blood which was given successfully from an O donor.

Neter (1936) recorded an O recipient whose serum agglutinated the red blood cells of a number of O subjects. The recipient had previously three blood transfusions without abnormal reactions. The abnormal iso-antibody disappeared during the course of the disease (sub-acute infective endocarditis).

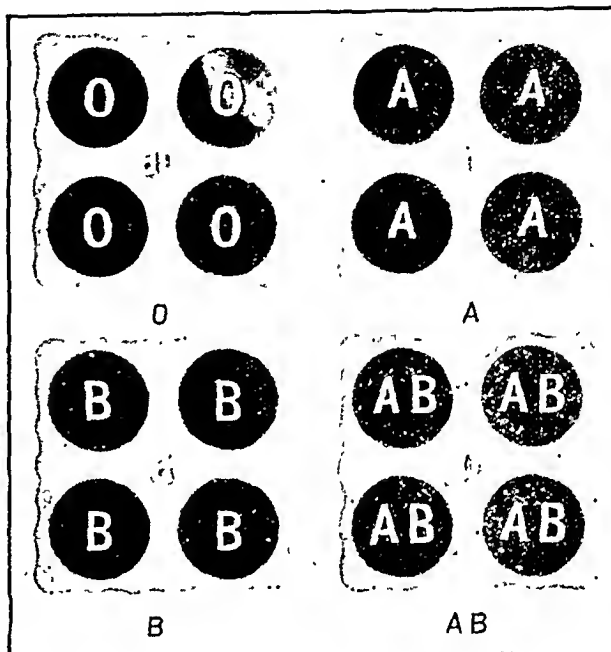
2. *Coagulation of the recipient's blood on exposure.*—Another difficulty often encountered is that the recipient's blood, one drop + the donor's blood one drop, with or without a drop of saline, on a slide, 'agglutinate'. The fact is that the recipient's blood coagulates on exposure to air. Presence of normal blood appears to contribute to the process. A case illustrating this difficulty occurred in one of the local hospitals a few months ago. The blood of the prospective recipient, a very bad case of anæmia and belonging to group A, was 'agglutinating' the red blood cells of every available group A donor, when matched directly, as described. When the recipient's serum was separated from a few drops of blood it did not agglutinate the red cells of any of the prospective donors of the same group. A successful transfusion was given and a rapid improvement in the patient's condition followed.

Short cuts in hæmagglutination are to be deprecated. The washed red blood cells (not

whole blood) and separated serum (not plasma) of the donor and the recipient should be tested against known sera and cells, and cross-matched.

3. *An antiserum formed in the recipient's blood against the serum proteins of the donor after a previous transfusion.*—Gyorgy and Witebsky quoted by Neter (*loc. cit.*) have recorded a case. The iso-antibodies in the recipient's serum against the donor's serum

Blood groups



Jansky	Moss	New
I	IV	O
II	II	A
III	III	B
IV	I	AB

A and B are the iso-hæmagglutinogens.

a and b are the corresponding iso-hæmagglutinins.

The group is named after the iso-hæmagglutinogens.

The four groups indicate the only four possibilities, compatible with life, in which the iso-hæmagglutinogens and the iso-hæmagglutinins can co-exist in the same subject. In a 'defective' group an iso-hæmagglutinin which can exist compatibly with life is absent (e.g., A, a; A, o).

Further division of A into A₁ and A₂ (and into A₁B and A₂B) increases the number of groups to six.

Quite unrelated to A and B are the hæmagglutinogens (not iso-hæmagglutinogens) M and N. They occur as M, N, or MN in all subjects of all groups. No subject is free from them. They differentiate three types in each group and thus make possible 12 descriptions of blood, if only the original four groups are considered, or 18 descriptions, if sub-groups with A₁ and A₂ are also considered. A blood may be:—

OM	ON	OMN
AM	AN	AMN
BM	BN	BMN
ABM	ABN	ABMN

A₁ and A₂ are of no significance in transfusion of blood. They are even ignored in forensic medicine by many workers because of difficulties of technique. M and N have great forensic value and, as is suggested in this paper, also a place in transfusion of blood.

could be demonstrated by skin test and complement fixation. Possibility of such a reaction should be excluded when a donor is used twice for the same recipient. We recommend precipitin reaction and skin test.

4. *Naturally occurring agglutinins in a recipient's blood against M type cells.*—At least one case of a naturally occurring anti-M agglutinin has been recorded (Wiener, 1935). A direct matching of the bloods of the donor and the recipient of the same group will eliminate the danger of an accident due to this cause.

5. *Agglutinins formed in the recipient, against M type and N type cells, after a previous transfusion.*—Such occurrences are well within the range of possibility. They cannot be excluded in Neter's case, as the serum was not tested with known OM and ON cells. A direct matching of the blood will eliminate the danger of an accident.

6. *Incompatibility of white cells and platelets.*—Snyder (1929), going by the work of Doan and his own surmise, contemplated creating more work for the serologist. Further observations on the subject have not been encouraging. Exclusion of these incompatibilities need not be undertaken.

II. Dangerous universal donors

The 'universal donor' belongs to group O. He has no iso-hæmagglutinin in his red blood cells but has both the iso-hæmagglutinins a and b in his plasma. His red cells cannot be agglutinated by any recipient's plasma; but his plasma, if its titre of a and b is high enough, can kill recipients of all other groups by agglutinating their red cells.

De Bakey and Honold (1938) draw attention to Hesse's statement that 'the transfusion of blood from a universal donor with a titre of 1:16 causes no symptoms but in cases with higher titre signs of hæmolytic shock are likely to occur'. The original publication is not available. The term titre in serological usage sometimes denotes the highest initial dilution of the serum used in putting up a test which yields results (e.g., titre of hæmolytic amboceptor and titre of complement) and sometimes the highest ultimate dilution reached in a test which yields results. The same term in bacteriological usage always denotes the highest ultimate dilution of the serum reached in a test which yields results. In titrating the iso-hæmagglutinins, equal quantities of the serum dilution and the red cell suspensions (usually 2 per cent) are mixed in putting up the test. We err on the right side and call 'universal donors of the first choice' only those group-O donors whose serum does not agglutinate red blood cells A or B in an initial 1 in 16 dilution. By all calculations based on the minimum dilution of the donor's plasma in the recipient's blood and on the minimum concentration of the recipient's red cells, donors of this titre are perfectly safe. A margin

also exists for the occasional variation of titre in the same subject.

This standard compares very favourably with the recommendation of Levine and Mahec (1923) 'that in performing the direct matching test of Coca (1918) the donor's citrated blood be diluted with saline 2:10 instead of 1:10 before mixing with the equal volume of recipient's citrated blood.' In the resulting procedure the donor's plasma in a 1 in 10 dilution (only half of the whole blood is plasma) reacts with the recipient's red blood cell, concentration of which may vary from 10 per cent (in a case of severe anaemia with a red cell count of only 1 million) to 50 per cent (in a case with a red cell count of 5 millions). A 1 in 16 dilution of a serum reacting with a 2 per cent suspension of red blood cells is more effective than a 1 in 10 dilution reacting with a 10 to 50 per cent suspension.

Even a 1 in 25 dilution of serum reacting with a 2 per cent suspension of red blood cells is more effective than a 1 in 10 dilution of serum reacting with 10 to 50 per cent suspension. The donors whose sera react with a 2 per cent suspension in a 1 in 16 dilution but not in a 1 in 25 dilution we call 'universal donors of the second choice'. Their blood can be transfused in much smaller quantities than the usual dose. Two hundred c.cm. should not be exceeded in the case of an adult.

In determining the range of the iso-hæmagglutinin titre of the population of Calcutta (unpublished work) we found that out of 37 subjects of O group:—

- Twelve conformed to the standard of the universal donors of the first choice;
- Eight conformed to the standard of the universal donors of the second choice;
- Eleven went beyond the range of safety; their serum agglutinated r.b.c. in a dilution of 1 in 25;
- Four were dangerous; their serum agglutinated r.b.c. in a dilution of 1 in 50; and
- Two were almost certain to cause serious accidents; their serum agglutinated r.b.c. in a dilution of 1 in 100.

Only the first 20 were 'universal donors', the last 17 were simply group-O donors.

Our dilutions were 1 in 100, 1 in 50, 1 in 25, 1 in 16, and 1 in 12. They were made as follows:—

(i), 1 drop from a calibrated pipette delivering 50 drops to 1 c.cm. + 1 c.cm. saline = 1 in 51 = 1 in 50 (approx.). Two drops of the dilution, from the standard pipette were used in testing against known cells A and cells B.

If agglutination appeared with dilution (i),

(ii), dilution (i) doubled by adding 1 c.cm. of saline = 1 in 100 (approx.). Two drops were tested as before.

If agglutination did not appear with dilution (i),

(iii), 1 more drop of serum added to dilution (i) = 2 in 50 or 1 in 25. Two drops were tested as before.

If agglutination did not appear with dilution (iii),

(iv), 1 more drop of serum added to dilution (iii) = 3 in 49 = 1 in 16 (approx.). Two drops were tested as before.

If agglutination did not appear with dilution (iv),

(v), 1 more drop of serum added to dilution (iv) = 4 in 48 = 1 in 12.

We consider this scheme of dilution particularly well suited to the titration of the iso-haemagglutinins. From the total bulk of fluid the outgoing quantities used in testing are looked upon as saline only, the small amount of serum in them being ignored. All the necessary dilutions are made by modifying the contents of one tube only. The gaps between the low dilutions are smaller than in the usual geometrical series, 1 in 2, 1 in 4, 1 in 8, 1 in 16, 1 in 32, 1 in 64, 1 in 128, etc.

In medical cases, whose physiology is below par, we discourage the use of universal donors. Their blood introduces into the system of the recipients iso-antibodies which are foreign to the latter's serological constitution and need elimination. In certain morbid conditions, however, the universal donor may be the only compatible donor.

It must be realized that all group O subjects are not universal donors.

III. Dangerous A and B donors for universal recipients

The 'universal recipient' belongs to group AB. He has the iso-haemagglutinogens A and B in his red blood cells but no iso-haemagglutinins in his plasma. His plasma cannot agglutinate any donor's cells but his red blood cells can be agglutinated by donors of all other groups if the titre of their iso-haemagglutinins is high enough.

The percentage of AB subjects being small donors are not easy to find. Generally an A or a B donor is provided. An O donor can also be provided. The titre of the iso-haemagglutinins a and b should conform to the standard discussed under II.

As a rule the titre of a and b is lower in B and A subjects than in O subjects.

IV. Wrongly grouped donors

Red blood cells of certain subjects of groups A and AB react slowly with sera a. If only the cells are grouped and not watched for a sufficiently long time (30 minutes) they are likely to be returned as O and B.

There are reasons to believe that there are slowly reacting subjects of group B and AB too.

The dangers arising from wrong grouping are effectively guarded against when both the cells and the serum are tested in grouping.

V. Aged and diseased donors

The age should as a rule be 20 to 36. Exceptions can be made in the case of well preserved subjects over 36. Prejudice against women donors is ill founded.

A rigid physical examination of the donor and enquiry into his history is enough to guard against transmitting disease to the recipient. A blood film may have to be examined. Allergic conditions and asthma in the donor are likely to cause immediate accidents. Wassermann reaction is usually done as a routine. Pre-chancere stage of syphilis can be excluded by absence of risky exposure during the previous 6 (for all practical purposes) to 12 (for absolute exclusion) weeks. Anaemia should be particularly excluded.

VI. Use of human immune serum from convalescent cases

Can serum from suitable recovered cases of an infectious fever be given intravenously to fresh cases of the same fever regardless of the blood group? Recently we had occasion to use such serum intramuscularly in smallpox. It could be used intravenously, too, subject to the same condition of titre as discussed under *Dangerous Universal Donors*. The same remarks apply to other human immune sera.

VII. M and N in transfusion

It is known that certain donors of blood are better suited for a recipient than others. Are they of the same type as the recipient? Should not the compatibility of both group and type be an important consideration in serious morbid states (such as severe anaemias, toxæmias and bacteræmias) in which a reaction is to be feared?

The technique of typing is as easy as that of grouping (Grevall *et al.*, 1939). The typing fluids, anti-M and anti-N, however, are difficult to prepare and expensive to purchase from commercial firms. All the recipients and the donors, therefore, cannot be typed as a routine.

VIII. Can a donor be used in emergency without a Wassermann reaction test?

Some time ago, for a bleeding case of enteric fever a donor could not be found until the evening. As his Wassermann could not be done the same evening he was asked to come for service next day in the afternoon. In the meantime the patient died. We hold that under such circumstances donors should be used if found fit on physical examination. Syphilis, if it occurs, can be treated later. Men marry, insure their lives and join the defence forces of the State without knowing their Wassermann reaction. Detection of syphilis in the male by means other than serological is not a difficult task.

IX. Can small quantities of blood be transfused without grouping?

The answer is no, although Nandi and Mukherjee (1930) in Calcutta claimed to have

disregarded grouping in giving 30 to 40 c.cm. of blood intravenously and repeatedly to many patients on many occasions.

Severe reactions have resulted from 10 c.cm. of blood given intravenously (Wiener, *loc. cit.*, page 56). Recovery, however, has been possible after a reaction following transfusion of less than 100 c.cm. of incompatible blood (Snyder, *loc. cit.*, page 43).

X. Can infants be transfused safely without grouping?

The answer again is no. Although the iso-agglutinins in infants are usually absent every infant cannot be presumed to be a universal recipient. Besides, the iso-agglutinins though absent at the time of the transfusion may develop later.

Transfusion from a safe universal donor can of course be given.

XI. Can grouping be disregarded in intra-peritoneal transfusion?

The answer once again is no. The blood from the peritoneal cavity is absorbed into the general circulation very rapidly.

XII. Can grouping be disregarded in giving injections of blood intramuscularly or subcutaneously?

The intramuscular and the subcutaneous injections have also been called transfusion of blood. It is better, however, to restrict the term transfusion to (i) intravenous, (ii) intracardiac and (iii) intraperitoneal injections of blood.

Small quantities of blood not given for purposes of increasing the volume of blood in the body, such as have been recommended for controlling hæmorrhages in infants, are given regardless of the group. The same considerations hold for immune human serum and adult serum given in small quantities, such as is done in aborting or modifying measles.

For larger quantities of blood given to infants, intramuscularly, to increase the volume of blood in the body, the group should be determined. But a safe universal donor may be used regardless of the group of the infant.

For giving large quantities of immune human serum, which are likely to increase the volume of blood in the body the group should be determined. But a pooled serum conforming to the standard of the safe universal donor (a 1 in 16 dilution not agglutinating or just agglutinating cells A and B) may be given.

XIII. Donors versus stored blood

The donors are often difficult to find while stored blood is available within a few minutes. 'Experimental work has established the safest maximum length of time in which the blood can be utilized as 10 days, with some investigators extending the period of therapeutic usefulness even to 30 days' (De Bakey and Honold, *loc. cit.*). In our experimental work, not connected

with therapeutics, we have injected into animals, human blood stored for over 2 months. When the demand for the stored blood is well established the storage need not exceed a few days. Human blood stands storage much better than sheep's blood with which all serologists are acquainted in connection with complement fixation reactions. The storage is said to decrease allergic reactions.

A scheme for stored blood has been recently suggested in the *Lancet* (15th October, 1938, p. 922).

Blood banks, of American nomenclature, can be run by the Red Cross Societies in big centres in India. The donors will donate blood free for their relations and friends. Mr. Smith will donate for Mrs. Smith and Mr. Brown for Mrs. Brown. If Mr. Smith's blood is not compatible with Mrs. Smith's blood but Mr. Brown's is, then, Mrs. Smith will receive Mr. Brown's blood. Mrs. Brown can receive Mr. Smith's blood, if compatible, or some one else's who has also donated free for his relation or friend. Same arrangements will hold for male relations and friends.

The same bank can also buy and sell blood, on a humanitarian basis, making enough profit to pay for the overhead charges of the establishment. The blood can also be given free to the poor who will give to the bank presents in cash, according to their means, on recovery. Full blooded subjects will come to the bank for blood letting.

The staff employed by the blood bank will have excellent opportunities of research on blood, to finance which organizations interested in research in India can be approached.

Only the stored blood can definitely bring the transfusion of blood within the reach of all cases of accident and hæmorrhage in childbirth, and all poor patients.

The stored blood will not do away with the providing of donors, altogether. Fresh blood and fresh unaltered blood, as opposed to citrated blood, will always remain in demand. Advance in immunology may even increase the number of donors by adding to them specially prepared donors.

With the details of collecting blood; testing, grouping and matching donors; keeping records; supplying blood; and receiving cash, this communication is not concerned. General observations, however, may be made concerning three innovations: (i) cadaveric blood which coagulates and 'disagulates' and has been used in Russia, (ii) preserved and sealed blood used in the Spanish Civil War, and (iii) blood derived from the placenta of healthy parturient women (from the cord—baby's blood. S. D. S. G.) (De Bakey and Honold, *loc. cit.*). To say the least, the processes are messy, risky and uncharitable. Given adequate organization, there is no dearth of blood collected and given or preserved under ideal conditions in any country or community, under any conditions of peace and war.

XIV. Risk incurred by donors

In the hands of a competent operator a donor runs no risk. An able-bodied man or woman of the right weight for height and age can easily part with at least 500 c.cm. of blood. An hour suffices to recover from any possible feeling of faintness, a day or so to make up the volume of blood in the body, and a week or so to make up the number of red corpuscles per c.mm. An average donor can safely donate 500 c.cm. of blood every four to six weeks.

We have a record of over 1,200 recipients whom we have supplied with donors. Not a single complaint has ever been received from any of the donors. Some of our donors, military medical students of the Calcutta Medical College, donate blood repeatedly for 5 years, without any ill effects. They are examined at frequent intervals for physical fitness, etc.

The age limit of 20 to 36 for donors, exceptions being made for well preserved subjects over 36, has been suggested more in the interest of the donor than of the recipient. There is very little danger of inadequate blood regeneration during this period.

The prejudice amongst Indians against becoming professional donors is mostly a social question. The sale of life's blood brings discredit on the family. Free donations would be easier to obtain if proper organizations existed to receive them. Such organizations once started would remove the prejudice too in a quiet way and would soon be taken over by commercial enterprises, as is occurring in the West.

Summary

1. A diagram explains the serological constitution of the blood groups (O, A, B and AB) and the types (M, N and MN).

2. Donors of the same group may be found to be incompatible on direct matching of bloods.

3. All group-O donors are not universal donors. Only those whose serum in a dilution of 1 in 16 does not agglutinate or just agglutinates cells A and B are, and should be called, universal donors of the first and the second choice.

4. All group A and B donors are not safe donors for the universal recipient. Only those whose serum in a dilution of 1 in 16 does not agglutinate or just agglutinates cells A or B are.

5. A weak A is responsible for wrong grouping. There may be a weak B too. The reactions should be watched for 30 minutes. The danger of wrong grouping is eliminated when both the cells and the serum are tested.

6. Disease in the donor is excluded by a rigid physical examination, scrutiny of history and possibly examination of a blood film. Allergic conditions are the real danger.

7. Human immune serum from convalescent cases can be given intravenously, subject to the same conditions as the blood of a group-O subject.

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CHORDOMA

By M. N. DE, M.B. (Cal.), M.R.C.P. (Lond.)

*Professor of Medicine, Medical College, Calcutta, and
First Physician, Medical College Hospitals*

and

B. P. TRIBEDI, M.B. (Cal.), D.B. (Lond.)

*Professor of Pathology and Bacteriology, Medical
College, Calcutta, and Bacteriologist to the
Government of Bengal*

(From the Department of Pathology and Bacteriology,
Medical College, Calcutta)

CHORDOMA is a tumour growth which arises from the remnants of the embryological notochord. Though its occurrence has been recorded in the past in considerable numbers, this type of neoplasm still remains rather a rare condition in the course of routine morbid histological diagnostic work.

The notochord gives rise to a tissue which has often been called cartilage. The notochordal tissue however differs from the typical cartilage

(Continued from previous column)

8. Haemagglutinogens M and N also deserve a consideration in transfusion.

9. A donor, if compatible and fit, can be used in emergency without a Wassermann test.

10. Blood should never be given intravenously without grouping, however small the intended quantity may be.

11. Infants cannot be transfused safely without grouping.

12. Grouping cannot be disregarded in an intraperitoneal transfusion.

13. Grouping can be disregarded in giving blood subcutaneously or intramuscularly, if the blood so given is not likely to increase the volume of the blood in the body immediately.

14. Stored blood can also be used for transfusion. In fact it is only the stored blood which will bring transfusion of blood within the reach of all cases of accident, hæmorrhage in childbirth, and poor patients who cannot afford to pay professional donors.

15. In the hands of a competent operator a donor runs no risk. An average donor can safely donate 500 c.cm. of blood every four to six weeks.

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structure. Williams (1908) described the principal stages in its development in the pig. The human notochord undergoes a development similar to that of the pig. After it has ceased to be an epithelioid rod of cells, its most characteristic feature is that it includes a portion of the nucleus pulposus. The notochordal tissue forms a vacuolized syncytium suspended in a gelatinous matrix, which, at the periphery of the nucleus pulposus, is bounded by a structureless membrane. The notochord is rarely a source of tumour formation, but, when it does give rise to one, this is composed of tissues similar to those normally found within the nucleus pulposus (Lewis and Bremer, 1927).

Stewart (1922), who described the first case in the British Isles and also gave an historical review dated from 1856 on the subject, recorded the published cases and discussed the morbid anatomy, histology and the clinical manifestations of this type of neoplasia. Coenen (1925) and Stewart and Morin (1926) recorded further cases of this type of neoplasia. Cappell (1928) while describing chordomas studied the embryology of the notochord in the human subject and observed certain aberrations of development of this tissue. Machulko-Horbatzewitsch and Rochlin (1930) described notochordal tumours and Mabrey (1935) recorded his observations on the study of 150 cases of this type of tumour. Dickson, Worster-Drought and McMenemey (1937) described a case of spheno-occipital chordoma and discussed its histology in detail.

Considering the rarity of these tumours a case of chordoma that we have observed is recorded below :—

K. F., male, aged 42 years, mason by occupation, came to the hospital on 7th January, 1937, for a growth on the lower part of his buttock. Four years back a small swelling about the size of a bean appeared over the sacrum posteriorly. This was slightly painful and tender. The size increased slowly and a globular mass of 2 inches in diameter appeared. He carried on his job without any inconvenience but 15 days before his admission he was gored by a bull and injured at the site of the tumour. After this incident the tumour increased rapidly and began to hang as a pendulous mass.

On examination.—A swelling 4½ inches in diameter was noticed in the lower part of the sacrum and coccyx. Skin over the swelling was tense, shining and hot. The mass was found to be fixed to the underlying structures. Rectal examination revealed no protruding mass. There was only slight tenderness over the posterior wall of the rectum in the lower part. X-ray examination showed complete destruction of the coccyx. No bone reaction was seen and the lower two-thirds of the sacrum were missing. The tumour was removed by operation on 25th January, 1937, and it was observed that though it was attached to the rectal wall it was completely separate from it.

The mass as obtained from the operation showed the following: The tumour was a globular mass, oval in shape and measured 5½ by 4 inches. The cut surface of the tumour mass was noticed to be partitioned into a number of areas of different sizes, sharply demarcated by bluish-white and grey strands. These circumscribed areas were composed of pale yellow, brown and red masses. At certain places, there were actual hæmorrhages, recent and old. The whole of the cut surface presented a gelatinous mucoid appearance which was a very marked feature (plate XIV, figure 1).

The histological picture of the tumour presented columns of cells, fibrous tissue strands and mucoid areas (plate XV, figure 2). On higher magnification most of the cells showed the typical cytoplasmic vacuolations (plate XV, figure 3). These physaliphorus cells were a marked feature in all the blocks that were studied. On still higher magnification the characteristic nuclear vacuolations, diffuse and circumscribed, could be seen clearly (plate XV, figure 4). At certain areas the cellular element was altogether deficient but extensive mucoid areas, as seen in plate XV, figure 2, were found.

The patient made an uneventful recovery and after the wound healed up he was discharged from the hospital on 21st March, 1937. He was traced and examined on 15th February, 1939. As to the general condition he was fairly well and carrying on his work as usual. On examination of the site of the tumour it was noticed that a globular mass, the size of a hen's egg and soft in consistency, had appeared half an inch below the scar mark of the last operation (figure 5). For the last six months he noticed this swelling which



Fig. 5.—Photograph showing the recurrence of the tumour *in situ* just below the old operation scar.

was very slowly increasing. He had no local complaints whatsoever and was inclined to ignore the recurrence.

Comments

The case under review corresponds in most points with the previously reported cases. It is interesting to note that the patient had no complaint except that of a hanging mass, and, though the tumour was attached to the rectal wall, it did not invade that structure. The greater incidence of this type of tumour in males brings up the question of trauma (Mabrey, 1935). In the present case there is definite association of trauma which at least aggravated the condition. Figure 5 clearly suggests a small recurrence immediately below the old scar. The prolonged course for over five years did not produce any marked effect on the patient's general condition which indicates the low grade of malignancy of this neoplasm.

Our thanks are due to Professor M. J. Stewart, Leeds, for confirming the histological diagnosis
(Continued at foot of opposite page)

PLATE XIV.



Fig. 1.—A drawing of the removed tumour; bluish-white and grey strands can be seen to divide the tumour mass into compartments. Note that their contents are different in colour in different areas; hæmorrhages can be seen at certain places.

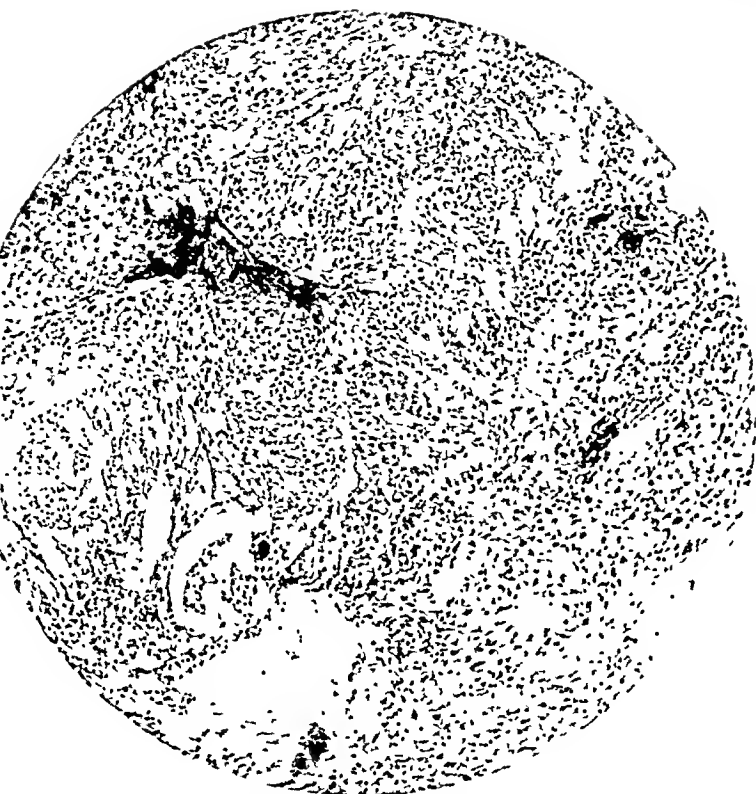


Fig. 2.—Photomicrograph (low power view) showing the columns of cells, fibrous tissue strands and the mucoid areas.
Ocular (Zeiss-compens)—no. 4.
Objective (Zeiss-apochromatic)—no. 10.

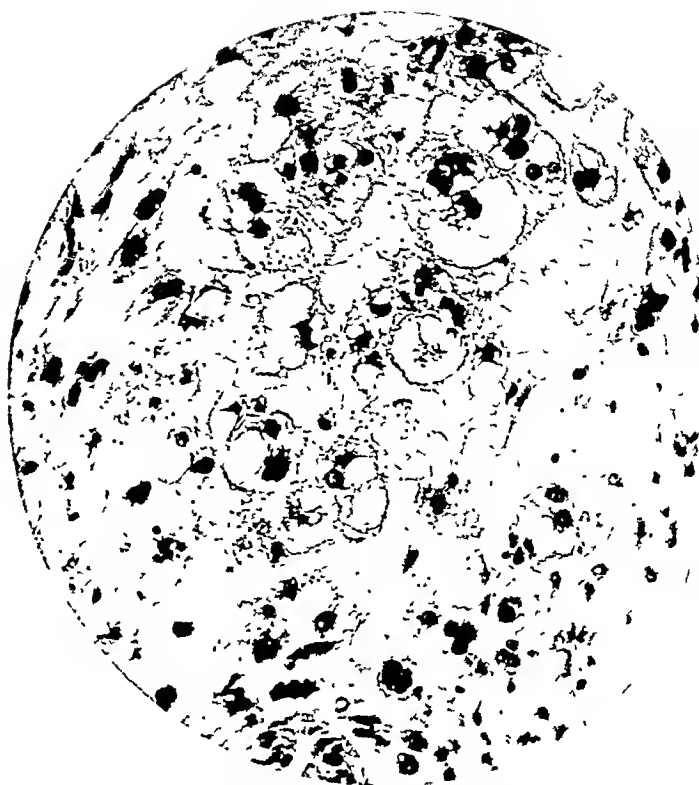


Fig. 3.—Photomicrograph (higher magnification) showing characteristic physaliphorus cells.
Ocular (Leitz-periplan)—no. 8 X.
Objective (Zeiss-apochromatic)—no. 6a.



Fig. 4.—Photomicrograph (much higher magnification) showing the typical cytoplasmic and one circumscribed nuclear vacuolation.
Ocular (Reichert-compens)—no. 12.
Objective (Zeiss)—no. 1/12" oil immersion.

ON CERTAIN CYCLICAL CHANGES OBSERVED IN THE BLOOD PICTURES OF CASES OF UNTREATED ANÆMIA COMPLICATING PREGNANCY IN TEA ESTATE COOLIES*

By K. P. HARE, M.B., B.S.

Hooghrija

Introduction.—In a paper on anæmia in tea garden labour forces, Napier (1937) stated, in support of a plea for the early administration of iron to pregnant women, that 'there is some evidence that these microcytic anæmias become macrocytic during the later months of pregnancy'. The evidence mentioned was not stated in that paper and a search of the scanty literature dealing with the subject has failed to reveal, either a repetition of the statement, or any evidence on which such a statement could be based†.

* Read before British Medical Association at Shillong, 11th March, 1939.

† The statement was based on the observation that amongst 100 labourers, male and female (early pregnancy not excluded), there were only 5 cases of 'hyperchromic anæmia' (Napier and Das Gupta, *I. J. M. R.*, 24, 855), whereas amongst pregnant women of the same population the incidence of 'hyperchromic anæmia' was about 33 per cent (Napier and Bilimoria, *I. J. M. R.*, 25, 529). In the latter series hypochromic anæmia predominated markedly in the early months of pregnancy, whereas in the last trimester about 50 per cent were hypochromic. In both series, though emphasis was laid on hæmoglobin content rather than size, the words 'macrocytic' and 'microcytic' could be substituted for 'hyperchromic' and 'hypochromic', respectively, without altering the truth of these observations.

Such evidence, though not conclusive, carries more weight than the negative findings in the six essentially hypochromic cases reported in the present paper. The subject is still open for further investigation.—L. E. N.]

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and letting us have two references and our thanks are also due to Dr. B. N. Mukherjee, Clinical Pathologist, Medical College Hospitals, for helping us in the collection of the material and to the Superintendent, Medical College Hospitals, Calcutta, for supplying us with the records.

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Now this statement is not only of academic interest, nor is it of interest purely as a basis on which to initiate prophylactic measures. If such a change from microcytic to macrocytic anæmia does in fact occur, a knowledge of the time of its occurrence and the character of the change would be more than likely to provide some evidence of an epidemiological nature on which an hypothesis as to the reasons for the change could be based. I therefore felt that evidence of a positive nature should be searched for, hoping that, if the statement were proved to be true, the epidemiological evidence would also emerge on analysis and our search for the true cause of the deadly macrocytic type of anæmia would take another step forward.

I therefore set myself the task of examining, at monthly intervals during their pregnancy, such anæmic women, spotted by near-by garden assistant medical officers, as were found to be in the early stages of pregnancy. The examinations carried out were as follows:—

- (1) A full clinical examination,
- (2) examination of the urine for albumin and sugar,
- (3) examination of the stools for helminthic ova,
- (4) estimation of hæmoglobin with the Sahli instrument,
- (5) red and white cell counts,
- (6) estimation of cell volume percentage of the blood using Napier's technique,
- (7) calculation of the usual mean corpuscular values,
- (8) examination of a stained blood film.

Fuller details regarding technique have been given in a series of papers dealing with other investigations into problems of anæmia which I hope will appear in the *Indian Journal of Medical Research*.

The series of cases on which this paper is based was dealt with during the latter half of 1938 and was in the nature of a try-out for a more ambitious programme on the same lines projected for 1939. I was engaged at the time on another series of pregnant anæmics so that I was only able to spare the time to examine fifteen women and, from the point of view of its conception, the experiment was a failure.

Six of the cases had passed the twenty-eighth week of pregnancy before their first examination (though that did not matter much because none of the six ever showed any tendency to a true macrocytic anæmia); more important, the three cases which did suffer from a true macrocytic anæmia with megaloblasts in the stained films and a high mean corpuscular hæmoglobin (MCH) were macrocytic when first examined at 20, 22 and 25 weeks. None of the remaining cases showed any permanent change from true microcytic to true macrocytic anæmia, or *vice-versa*. Evidence in support of the suggested transformation was, therefore, completely lacking and, from that point of view, we are in the same position as before.

Some observations of interest did emerge, however, and form the basis of the present communication.

The observations reported

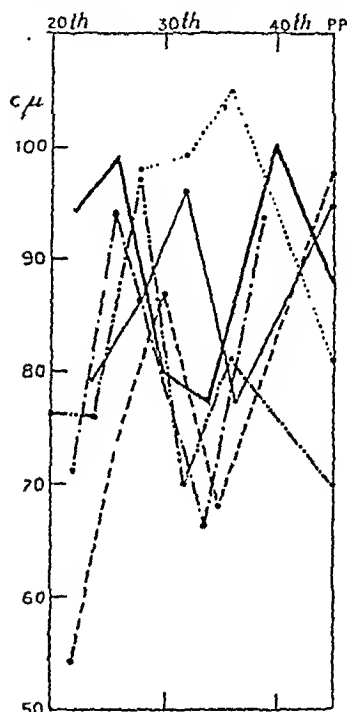
Of the fifteen women examined, six fulfilled three main conditions:—

- (1) They were examined at intervals of at least four weeks on at least three occasions before delivery,
- (2) they did not deliver until full-term,
- (3) none of them received any anti-anæmic treatment of any description.

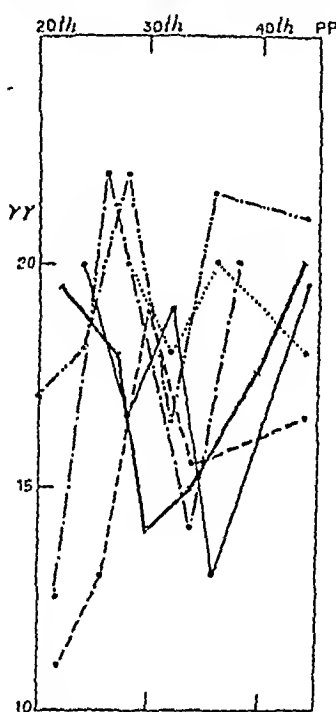
During the progress of the investigation it became obvious that changes were taking place in the blood pictures of these women without any apparent reason and that, taking individual cases, the changes were not always in the same direction. I was, at first, afraid that these

in each case, against duration of pregnancy in weeks, shows that the variations recorded do not occur at exactly the same time in each case though a fair time relation does exist, but that for each mean corpuscular value the majority of the cases show the same type of curve. This particularly applies to the central portion of the curves—that covering the period between the 28th and 36th weeks of pregnancy.

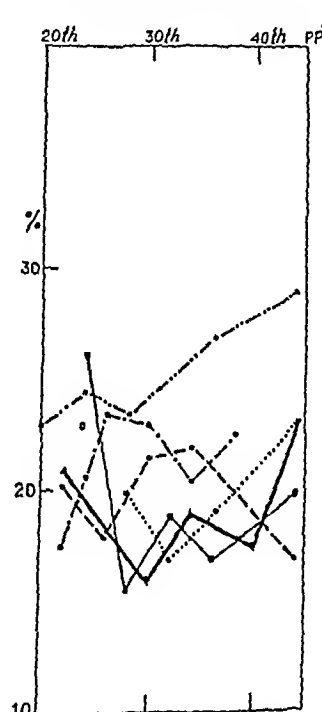
Curves of mean corpuscular volume.—The central portion of five of the curves is of 'V' formation with the low point occurring somewhere between the 28th and 36th weeks of pregnancy. In three cases both the high points are well marked. In one the first examination was too late to catch the first high point and in another, one examination was missed so that the second high point, though suggested by the subsequent post-partum examination, was



M.C.V.



M.C.H.



M.C.H.C.

Three usual mean corpuscular values plotted against duration of pregnancy in weeks.

changes might be merely an indication of faulty technique and would therefore throw suspicion on other observations. But, as these changes occurred in all the cases it seemed more probable that they were real and might be periodic in nature. I therefore plotted the usual mean corpuscular values in each case against duration of pregnancy in weeks and found that in the majority of cases the curves were of the same general form. The similarities were sufficiently marked to render it almost inconceivable that the variations were due to errors of technique. It therefore behoved one to examine these variations in detail to see if any other cause suggested itself.

Examination of the diagrams, which show mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), and mean corpuscular haemoglobin concentration values plotted,

missed. The remaining curve is of reverse 'V' formation, having a high point at the 32nd week and low points at the 28th and 36th weeks. In the majority of cases, then, there was a tendency for the cells to be normocytic about the 28th and 36th weeks of pregnancy with a tendency to microcytosis during the intervening period.

Curves of mean corpuscular haemoglobin.—Here again, the central portion of five of the curves is of 'V' formation and, again, the low point occurs between the 28th and 36th weeks. In one case, as before, the second high point was missed but is suggested and in the sixth case, as before, the curve during the critical period is a reversed 'V' with the high point at the 32nd week. This is the same case which showed a reversed curve for MCV. We may say that there is a tendency, in the majority of cases in

this series, to marked hypochromicity during the period between the 28th and 36th weeks and that round about the 28th and 36th weeks the anaemia tends to be less hypochromic.

Curves of mean corpuscular haemoglobin concentration.—This set of curves is rather more complex. Three of them show the 'V' form during the critical period: one shows a steady rise, and the other two, one of which is the case whose other curves were reversed, show a reversed 'V' form. In other words, the degree of saturation of the red cells with haemoglobin is also variable but its variations do not appear to be subject to a definite law.

Discussion

I have shown that, in the only six cases of anaemia complicating pregnancy which were untreated and fulfilled all the conditions laid down earlier in this paper, variations have occurred in the three main mean corpuscular values. As regards volume and haemoglobin content, all except one case varied in the same manner and, approximately, at the same time. In the remaining case the variations took place at the same time but were in the opposite directions. With regard to corpuscular saturation the variations were irregular.

Now, what is the explanation of this difference? I suggest that the irregularity of the variations in corpuscular saturation is due to the rapidity with which the alterations in volume and haemoglobin content are taking place. The blood, in other words, is in an unstable condition during the latter half of pregnancy.

What is the cause of this instability? We know that the rate of growth of the foetus in *utero* varies with the duration of pregnancy. The figures given by Bourne (1932) and by Jellett and Nadill (1930) for foetal measurements and weight at various stages of pregnancy show that growth is very rapid between the 28th and 32nd weeks and slows down enormously between the 32nd and 36th weeks. I have not, however, been able to discover in the literature available to me any information as to the nutritional needs of the foetus. I suggest that, *pari passu* with the varying rate of foetal growth, these needs may conceivably also vary from time to time. In that case, even if the mother's intake of iron, calcium and the vitamin-B complex remained at a steady level, increased foetal calls for certain substances at certain times might render the intake deficient in one or more particulars. If the views of those workers who support the theory that these anaemias are nutritional in origin are correct, such variations in the effective intake of certain essential blood-forming substances would be sufficient to account for the haematological changes described above.

In any event, whatever may be the cause, I feel that attention should be drawn to the occurrence of these variations owing to their

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EXPERIMENTAL MALARIA INFECTIONS IN TWO RACES OF *A. STEPHENSI**

By PAUL F. RUSSELL

and

B. N. MOHAN

This brief note reports some comparative experimental tests of two races of *A. stephensi* Liston, 1901, as to their susceptibility to infection with *P. falciparum* Welch, 1897. The mosquitoes used were: (1) *A. stephensi* (type) and (2) *A. stephensi mysorensis*, as described by Sweet and Rao (1937). Those of the type form were obtained from larvae in our laboratory colony which was started with larvae from some wells in Madras City. Those of the form *mysorensis* were obtained from larvae collected for us by one (B.A.R.) of the authorities whose work led to the separation of this form from the type (Sweet and Rao, 1937) and brought by us from Bangalore to Madras. We did not ourselves make a differential diagnosis.

We fed the mosquitoes in three lots, both races in each lot feeding at the same time on the same carrier and having the same treatment thereafter. In lots 1 and 2 the donor was a girl of 4 years having for the first lot 6 and for the second lot 4 crescents per 100 leucocytes. The donor in lot 3 was a girl of 9 years having 3 crescents per 100 leucocytes at the time the mosquitoes were applied. In lot 2, some mosquitoes

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(Continued from previous column)

bearing on the interpretation of the results of treatment of anaemia. All these six cases received no treatment whatsoever yet their blood pictures underwent great changes. Had they been receiving treatment one would have been tempted to claim that the changes were the result of whatever specific treatment had immediately preceded them. To my mind there is a danger in attempting to classify anaemias on a basis of response to treatment when our knowledge of their underlying pathology is so scanty.

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TABLE I

Susceptibility of A. stephensi type and A. stephensi var. mysorensis to infection with P. falciparum

<i>Stephensi</i> type	Number dissected	Gut positive	SPOROZOITES		ALL INFECTIONS	
			Number	Per cent	Number	Per cent
Lot I	17	3	9	52.9	9	52.9
* Lot II	2	0	0	..	0	..
Lot III	42	0	16	38.1	16	38.1
TOTALS ..	61	3	25	41.0	25	41.0
<i>Stephensi mysorensis</i>						
Lot I	49	7	17	34.7	18	36.7
* Lot II	16	1	6	37.5	6	37.5
Lot III	24	1	9	37.5	9	37.5
TOTALS ..	89	9	32	36.0	33	37.1

* The two *type* specimens and 7 of the 16 *mysorensis* appeared to have taken only about half the usual amount of blood.

One of the 7 half-fed *mysorensis* had infected glands. The other 6 half-fed *mysorensis* and the two *type* form mosquitoes were negative.

Lot I, except for a few, was dissected on the 9th day.

The exceptions were dissected on the 8th day.

Lot II was dissected on the 9th day.

Lot III, except for 2 mosquitoes of each race, was dissected on the 10th day. The four exceptions were dissected on the 9th day.

were half-fed on account of the restlessness of the donor. All lots were offered 'conservation' feedings on rabbits during the extrinsic incubation period.

Our results are shown in table I. The *mysorensis* form was not obtainable in larger numbers so that our totals were not so great as desired. However, they were sufficient to indicate that both the *type* and the *mysorensis* form could be easily infected experimentally and that they were about equally susceptible. The percentage of sporozoite infections in 61 of the *type* form dissected was 41.0 and in 89 *mysorensis* the figure was 36.0 per cent. If oöcyst infections are counted the infection rate in the *type* form was 41.0 per cent and in *mysorensis* it was 37.1 per cent. We saw no morphological differences in sporozoites in the two races of mosquitoes

Summary

A. stephensi Liston, 1901, (*type*) and *A. stephensi mysorensis* Sweet and Rao, 1937, were easily and about equally infected experimentally with *P. falciparum* Welch, 1897.

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IONISABLE IRON IN COWS' AND MOTHERS' MILK

By J. C. PAL, M.Sc.

Department of Biochemistry and Nutrition, Indian Institute for Medical Research, Calcutta

In a series of earlier publications the nutritive values of Indian food-stuffs and dietaries with reference to their vitamin content, protein and more physiologically important minerals, such as calcium, phosphorus and iron, were investigated (Chakravorty, Mookerjee and Guha, 1933; Ghosh, Chakravorty and Guha, 1933; Ghosh and Guha, 1933; Ghosh and Guha, 1934; Ghosh and Guha, 1935; Guha, 1934; Guha and Chakravorty, 1933). These investigations revealed in certain deficiencies of Indian diets in protein, in certain vitamins and in calcium and phosphorus. A study of certain cooked diets obtained from middle class families, students' hostels and hospitals in Calcutta (Pal and Guha, 1937) showed, however, that while there may be an appreciable deficiency in calcium, the consumption of iron seemed to be more than optimum. In a later paper (Roy, Pal and Guha, 1939), it has been found that of the total iron present in the diets analysed, only a small fraction is present in assimilable form. Researches during

recent years have shown that only ionisable iron present in food-stuffs is available for hæmoglobin regeneration. In the present paper, attempts have been made to obtain information about the presence of ionisable iron as percentage of total iron in cows' and mothers' milk. For this purpose, 10 different samples of cows' milk obtained from different sources and two mixed samples of mothers' milk were analysed and the values are given in the attached table.

Experimental procedure

The ionisable iron was estimated by α -dipyridyl method (Hill, 1930; Shackleton and McCance, 1936). Into five wide test tubes graduated at 20 c.cm., and marked A, B, C, D and E, 5 c.cm. of milk were taken, and 10 c.cm. of acetate buffer of pH 5.5 were added to each of them. They were then heated on a water

Discussion and Summary

Ten different samples of cows' milk from a dairy, a local milkman and a local market were analysed. Both the total and ionisable iron present in them are comparable. Only two mixed samples of mother's milk could be analysed, because nearly 100 c.cm. of milk is required for every experiment and it is very difficult to get such a large quantity of mothers' milk. It was found that almost all the iron present in milk is in available form. The average available or ionisable iron content in cow's milk from different sources is 0.635 mg. per 100 c.cm. of milk, which is almost equal to the total iron present in the samples. The mean figure for ionisable iron in mothers' milk is also almost the same as the total iron present and is found to be 0.625 mg. per 100 c.cm. of mothers' milk. Recovery of added iron was 100 per cent.

Ionisable iron in milk

Cows' milk

Source of milk	Serial number	Ionizable iron in mg. per 100 c.c. of milk	Total iron in mg per 100 c.c. of milk	Quantity of iron added	Per cent recovery	Ionizable iron as per cent of total iron
Dairy ..	1	0.6	0.66	0.03 mg.	100	90.9
	2	0.6	0.64	0.03 mg	100	93.7
	3	0.6	0.68	0.03 mg	100	89.9
	4	0.6	0.64	0.03 mg	100	93.7
Market ..	1	0.7	0.71	0.03 mg	100	98.5
	2	0.65	0.68	0.03 mg	100	95.5
	3	0.6	0.62	0.03 mg	100	96.7
Milkman ..	1	0.7	0.715	0.03 mg	100	97.9
	2	0.65	0.66	0.03 mg	100	98.4
	3	0.65	0.665	0.03 mg	100	97.7

Mothers' milk

Eden Hospital ..	1	0.65	0.655	0.03 mg.	100	99.2
	2	0.6	0.61	0.03 mg	100	98.3

bath for 10 minutes and allowed to cool. After that they were filtered and the filtrate made up to 20 c.cm. mark with distilled water and the pH of them was checked. About 0.5 to 1 gm. of iron-free sodium sulphite was added to each tube and a known amount (about 0.03 mgm.) of iron was added to C and D, to test recovery of iron by this method, and allowed to stand over night. On the following day a few crystals of α -dipyridyl were added to A, B, C and D and E served as blank. They were kept over night for the development of colour.

Next day they were compared against standards prepared after Hill (1930). For the estimation of total iron about 75 c.cm. of milk were evaporated to dryness on a water bath. The evaporated mass was ignited and ash taken to solution with diluted hydrochloric acid. From this solution the total iron was estimated by the method previously described (Pal and Guha, 1937).

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FIVE YEARS OF ANTI-MALARIA WORK AT BARWADIH RAILWAY SETTLEMENT

By N. AHMED

Divisional Medical Officer, East Indian Railway

General.—Barwadih, a railway settlement on the Gomoh-Sone East Bank branch of East Indian Railway, is 18 miles south-west of Daltonganj. It is situated 348 miles west of Calcutta in the hilly tracts of the Ranchi plateau in the Palamau district of Bihar province. The range of hills to the south of the colony is a branch of the Vindhya.

Physical geography and meteorological data.—Latitude 23.5°, longitude 85°, elevation 900 to 1,800 feet, temperature maximum 108° to 118°, minimum 38° to 32°F., humidity varies from 15 to 20 in the hot weather to 90 during the monsoon. The subsoil water rises from 4 to 6 feet during the monsoon as compared to the summer level of 26 to 30 feet. The humidity of soil is at its height during the four months of the rains. It falls very low in late winter and summer and often rises a little in the early part of spring. The winds are westerly and north-westerly in summer and winter and purely easterly—full of moisture and heat—in the monsoon.

Rainfall.—Average 50 inches in a year, four-fifths of which fall during the monsoon and half of it in July and August and a few showers in winter. Malaria infection and its manifestations always begin three to four weeks after the initial fall of rain. Early and heavy rains used definitely to mean an early and heavy infection but since adequate anti-malaria measures have been taken at Barwadih the increase in rainfall has no adverse effect on the rate and intensity of infection as the comparison of the figures for 1934, 1935 and 1936 shows. The rainfall was 51.74, 36.04 and 60.07 inches respectively but the heavy showers in 1936 did not bring the intensity of 1933 and the malaria figures continued to go down.

Table to show that rainfall has no effect on malaria in a well-controlled area

	YEAR		
	1934	1935	1936
Rainfall in inches	51.74	36.04	60.07
Malaria sickness (new cases).	130	103	101

Telluric conditions.—The soil is porous of 'Morrum' variety interspersed with rock. On the south is a range of hills rising from 500 to

700 feet high, densely wooded. The foothills are covered with light jungle. The open spaces between the hills are under rice cultivation. There are collections of water shaded with overgrowth, bowers of shrubbery and branches of trees.

Site of the railway colony.—The level of the highland at the foothill drops from 50 to 100 feet at places to a plot of land 1½ miles in length east-west and ¼ to ½ mile in breadth north-south. This is the site of the railway colony.

On the north are swamps, cultivated lands and *bustees*. On the west are low-lying land, culverts, a high embankment, swamps, rice fields and a few villages.

Natural drainage.—Natural drainage of the area is by two hill streams. One a fairly big one running east to west about half a mile in front of the station joins with the smaller one on the north-west which in turn drains into the Koel river, three miles west of Barwadih, in the bed of which the storage wells and pumping station for the water supply of Barwadih are located.

Malaria.—According to Christopher's malaria map of India, Barwadih lies in a region known for 'moderate to high endemicity of more or less static character, the intensity depending on local surroundings'. The following description will show how adverse local conditions made it a hyperendemic place:—

The area was originally under rice and maize cultivation having big bunds for catchment and shallow ponds for storage of water for the fields. On the Central India Coalfields railway acquiring the land for construction of a railway line, abandoned and neglected fields and ponds became shallow pools and swamps with weeds and tall grass which served as excellent breeding places for mosquitoes; these found ideal conditions for the primary meal of blood necessary for the oviposition in the large staff of labourers who were engaged upon the construction of the line, and who were living under conditions that made them readily accessible to biting insects by night or day.

After the construction work was over a chain of borrow-pits, excavated land and dilapidated old *kutcha* buildings occupied by the construction staff were left behind and added to the already existing breeding places.

When the East Indian Railway took over the section for working in 1929, we were faced with the problem of housing our staff in one of the most unhealthy parts of the country.

The normal balance of infection was so materially changed by this that malaria broke out in epidemic form in 1930; over 95 per cent of our railway population at this station was found to be infected, the parasitic index was 78 and the splenic index was 95, and Barwadih was rapidly becoming uninhabitable. This state of affairs roused all departments of the railway and within 5 years the parasitic index fell from 76 to 0.7, the splenic index from 95 to 0.5 and

the malaria sickness from 676.9 to 99.5 per mille. The method by which this most satisfactory result was obtained is best described in its two stages, first in 1931 to 1934 when the measures taken were inadequate and spasmodic, and 1934 to 1936 when scientific organization and control was instituted against this disease.

In 1931 the anti-malaria campaign was started in Barwadih, jungle was cleaned, filling of hollows was started, dilapidated buildings were demolished and anti-larval measures were undertaken, a rough malaria survey was performed and the chief enemy was discovered to be *A. culicifacies*; an interesting experiment was also tried this year in the form of 'blanketing' with quinine and plasmochin. The results were encouraging, the splenic index coming down from 95 to 50, the parasitic index from 72 to 24 and the sickness from malaria from 677 to 280 per mille.

In 1932 there was cessation of activity, with the result that the parasitic index rose from 24 to 48 and the sickness from malaria increased from 280 to 445 per mille. The inactivity of this year and its results were a striking object-lesson of the danger of even a temporary cessation of preventive work in a highly endemic area.

In 1933 work started again much on the same lines as in 1931 with the difference that atabrin was first used in treatment, the work of draining the station was continued together with the filling up of low-lying areas, and in October it was decided to 'blanket' with atabrin and plasmochin. Every man, woman and child in the railway colony received a full curative dose of atabrin followed by a full course of plasmochin. This was most thoroughly done by an experienced assistant medical officer and it is in striking contrast to the 'blanketing' supervised later (1937) by an officer who had no experience in this work. The parasitic index was taken before the 'blanketing' and found to be 48, the splenic index was 47, afterwards the parasitic index fell to 6 and the splenic index to 26, the sickness from malaria dropped from 445 to 231 per mille.

In 1934 the second stage of the work started, it was now realized that the measures taken before had been based on most inadequate data, the result of surveys undertaken by inexperienced men, and that it was impossible to expect any permanent benefit from measures founded on such an unsatisfactory basis. Most unfortunately the ignorance even of members of our own profession regarding the cause of malaria adversely affected the results; a statement was made by one of the doctors in charge of the anti-malaria work that 'it is my firm conviction that unless something is immediately done to supply the staff with good filtered water no amount of money spent on any other anti-malaria measures have any chance of success'. As a result of this much time was wasted and much money was

spent in the improvement of what was not at all an intrinsically bad water supply.

The measures now undertaken included a survey by experts, the establishment of a laboratory on the spot and expert advice from the School of Tropical Medicine, Calcutta, and the Malaria Research Institute, Kasauli. I will now detail the results of these measures.

Survey.—(1) A general survey of the colony, surrounding land and villages was done by Dr. Strickland and myself. We found that large-scale operations for filling were not necessary as it was possible to drain every inch of low-lying ground. Indiscriminate deforestation was stopped until the possibility of the existence of sun-breeders, such as *A. maculatus*, could be negated.

(2) A detailed survey was carried out and sectional maps showing the minutest details were prepared. Taking the railway quarters as a centre an inner circle with a quarter-mile radius and an outer circle with a half-mile radius were drawn. Each circle was divided into four quadrants and each quadrant into four sections. All the breeding places found in the colony and half a mile outside it were separately numbered and shown on the sectional maps. Control maps showed various treatments that those breeding places received monthly. Weekly, fortnightly, monthly and annual reports of the work done were submitted regularly.

(3) The splenic index of children under the age of 10 years, in the colony and the surrounding villages, was taken. The estimate of the parasitic index of outsiders could not be taken.

(4) Barwadih had gained such a notoriety for loneliness and bad climate that it was not easy to keep a trained staff for the specialized work there. The first laboratory assistant resigned within 7 days, the second left in 6 weeks and the third is now working. The malaria inspector resigned in 2 months and was persuaded to come back but resigned after 18 months. The new man is still at work.

Engineering.—Most of the filling and levelling operations were done in 1934 before the detailed survey in August. A large tank on the west of the station was filled, subsoil water drains were constructed and thousands of feet of *kutchha* and *pucca* drains were made so that in 1936 there were over twelve thousand feet of excellent *pucca* drain.

Field work—anti-larval measures

Each man in charge of a section started from the centre of his section and systematically treated every breeding place in it. Small holes were filled in, drains were cleaned, such levelling as was necessary was performed and low shrubs, tall grass and jungle were cleared whenever necessary.

Paris green.—We use the 'Genxco' mixer for mixing paris green and soap-stone powder. We have a small measure for paris green and a large

one for soap-stone so made that even a coolie could make a correct mixture.

(2) We made some interesting experiments with Hoyle's and Britway paris green and found 1 per cent mixture of Hoyle's paris green quite sufficient for our work. Britway was not found so efficacious.

(3) 'Junior Savage Duster' was found very handy for small streams, drains and ditches. 'Smith Broadway Duster' and 'Mysto Rotary Blower' both were found very useful for large collections of water. With a few demonstrations and strict supervision in the beginning the coolies are handling these instruments very efficiently.

(4) We found the limitation of paris green distribution during the monsoon. Every fresh shower destroys the film of powder and it is not so efficient as oiling. We therefore rely more on oiling than paris green when the monsoon is very active.

Note.—Two of our coolies at Tatanagar had arsenical dermatitis of the hands due to careless handling in the mixing of paris green with soap-stone. With the 'Genexco' mixer we have had no such accident for the last three years.

Oiling.—We used hydrocarbon, crude oil and crude naphtha till 1935 and it killed larvæ both culicine and anopheline in 48 to 72 hours. In 1936 we used 'Killsall' with crude oil 1 in 20. The effect was excellent. Within one hour the mature larvæ were destroyed and an examination of the treated place after 24 hours showed not a single larvæ alive there. We have found 'Misto Pneumatic Sprayer' for oil a very useful and economical apparatus. It can be handled easily by one man for hours without fatigue. It leaves one hand free and effects great economy in the use of oil.

Anti-mosquito measures

(1) *Spraying of houses with insecticide.*—Tall grass and jungle that grow round the quarters are cut. This deprives mosquitoes of their natural hiding places and they take refuge in the quarters. The trained malaria staff then go to the quarters and efficiently deal with them by closing the rooms and spraying Hick's insecticide. This kills 20 per cent of the mosquitoes outright and makes the rest of them unconscious. After a quarter of an hour dead and dying mosquitoes are collected and destroyed. The trouble of entering *purdah* houses is overcome by appointing a female coolie for the job.

(2) *Railway carriages.*—Railway carriages temporarily stabled at Barwadih were found to become very good hiding places for mosquitoes. They were specially found under the seats. It is worth keeping in mind that railway carriages are one of the means of conveying mosquitoes from one station to another which may be hundreds of miles away. Steps were taken at Barwadih to see that carriages coming in or going out neither became a shelter nor means

of conveying mosquitoes to and from Barwadih and other stations on the line.

(3) *Running rooms.*—The running rooms are all provided with mosquito-proof wire gauze doors and windows with automatically closing hinges. Mosquito nets are also provided for guards, drivers and running men stopping at Barwadih for the night. The employees and their families are all advised to use mosquito nets in their houses.

(4) *Propaganda.*—Propaganda work has also been done to teach people the habits of mosquitoes, the danger that they carry and how to deal with them and their breeding places individually.

Methods of check on the work.—(1) A check on the efficiency of anti-larval measures was made by daily collections of anopheline larvæ from water collections in the area, counting the catches, hatching them out and identifying them. The places where anopheline larvæ were found received daily attention till free and then the usual weekly attention was all that was needed. All these operations were marked on newly-made sectional maps.

(2) A check on the anti-mosquito measures was made by counting the systematic daily catches from the houses and comparing them with the successive ones. If results were unsatisfactory extensive search was made for any undetected breeding place around the quarters.

(3) A general check on the work was done by comparing the results of our catches in the colony with those of our daily catches from the huts of the surrounding villages and *bustees* adjacent to our colony.

Malaria and laboratory work.—Having a well-equipped laboratory and an efficient laboratory assistant we could do systematic and scientific work of identification and dissection of mosquitoes and recording of parasitic index. From 1931 to 1934 we did not even know the actual carrier of malaria of the locality nor could we prove the existence or absence of a *sun-breeder* on which the planning of the nature of our field work depended to a great extent.

Collection of larvæ and mosquitoes (1935 and 1936)

Adults.—There were two catches a day, one in the morning and one in the evening, from the colony and from the surrounding *bustees*. To make a comparative study the *bustee* catches were of great benefit. Eleven *bustees* surrounding the colony were taken into consideration, from each a daily catch would come. Catches were taken one after another in order. Total catches from the colony and the *bustees* were 40,011 out of which about 1,500 were hatched from larvæ. The variation in the incidence month by month was recorded and is interesting and instructive.

Larvæ.—Larvæ were caught from all known varieties of breeding places within and outside the colony, hatched out and identified. No

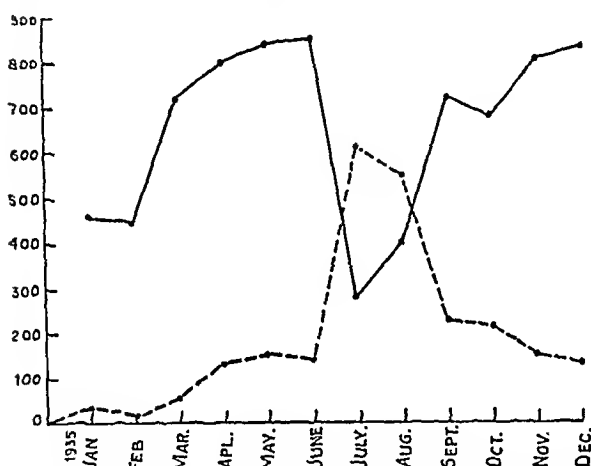
larvæ were found in the colony from April to June and in November and December.

Identification.—There were 13 varieties of anopheline found from adult catches and ten from hatched-out ones. Five of them were dangerous, three of doubtful nature and the rest non-carriers. The highest incidence is of *A. culicifacies* and next comes *A. rossi*.

Anopheline fauna of Barwadih

Dangerous type	Doubtful type	Non-carriers
1. <i>A. culicifacies</i> .	1. <i>A. annularis</i> .	1. <i>A. rossi</i> .
2. <i>A. funestus</i> .	2. <i>A. maculipalpis</i> .	2. <i>A. vagus</i> .
3. <i>A. stephensi</i> .	3. <i>A. pallidus</i> .	3. <i>A. theobaldi</i> .
4. <i>A. maculatus</i> .		4. <i>A. hyrcanus</i> .
5. <i>A. listoni</i> .		5. <i>A. jeyporiensis</i> .

The monthly incidence of the local carrier is illustrated in the accompanying graph :—



Monthly incidence of *A. culicifacies* (local carrier) —
Monthly incidence of *A. rossi* - - - - -

Anopheline fauna of Barwadih

Sun-breeders.—The possibility of the existence of sun-breeders such as *A. maculatus*, *A. listoni* or *A. minimus* in a montane or submontane region is very great. Deforestation in such regions has been known to have caused a severe epidemic of malaria in an otherwise endemic area. They breed in open spaces against which jungle and shade are the best remedies. Hill rivers, such as we have on the north, which swell during rains leaving pools of water in their beds, hill streams and springs among rocks, as we have at the foot of the hill on the south, and collections of water which have no marginal vegetation are all potential sources of *A. maculatus*. We were alive to the danger and took precautions to guard against it till in 1935 we caught *A. maculatus*. An extensive search was made and we hatched out a few larvæ and thus detected breeding places in the colony and outside and adequately dealt with them.

Dissection.—We dissected dangerous and doubtful varieties and when time permitted a few non-carriers as well. In 1935 after dissecting 5,355 mosquitoes we found sporozoites in *A. culicifacies* from the morning catch within the colony on 26th August, 1935. A month later another *A. culicifacies* from an evening catch from the Karia bustee outside the colony was found positive. The total number dissected was 20,138 out of which only two *A. culicifacies* were found positive in 1935 and none in 1936.

Parasitic index.—This was recorded twice a year in March and September through examination of the blood of almost all the healthy persons in the colony. A monthly record of all the cases examined was also kept.

Splenic index.—Separate records of the enlargement of the spleen in children below 10 and of persons above 10 years of age were kept. The splenic index given in this paper is of children below 10 years.

Blood slides of patients.—The blood of all the fever cases was examined. The blood of positive cases was taken every day to note the effect of the remedies on the disappearance of parasites from the blood. The blood was also examined at the end of quinine or atabrin treatment to see if gametocytes persisted and whether a course of plasmochin was indicated or not.

Clinical control.—Man is a reservoir of malaria. Mosquitoes are only carriers. The treatment of infected cases is therefore as important as the destruction of mosquitoes. We have very comfortable indoor accommodation to treat malaria cases in the hospital and have an efficient organization immediately to detect, diagnose and treat the cases occurring anywhere in the colony.

We tried various modes and combinations for administering quinine, atabrin and plasmochin and tonics in an attempt to cut down the actual sick days and recuperation time, and achieved great success. We reduced the days of fever from 10 to 5 and then to 3 and recuperation time from 7.5 to 4.5 days. The question of carriers from amongst the sick was dealt with by examining their blood and if gametocytes were found by giving a course of plasmochin.

Results

(1) We found the local carrier *A. culicifacies* by actual dissection.

(2) We found the sun-breeder *A. maculatus*.

(3) We reduced the number of sick days due to malaria as well as to all other diseases. The parasitic index dropped from 26.5 in 1933 to 0.7 in 1935; splenic index from 26 to 6, total malaria sickness from 231.5 to 99.5 per mille and sick days lost due to malaria from 3,059 to 1,179.

(4) The table below gives all the figures from 1930 to 1936 including the cost of all the operations except the engineering work :—

TABLE
Showing the results obtained by anti-malaria work at Barwadih

Particulars	1930	1931	1932	1933	1934	1935	1936
Strength of staff ..	195	200	200	203	207	219	231
Rainfall in inches ..	51.31	54.61	49.22	53.55	51.74	36.04	60.07
Sickness due to malaria (staff only).	665	618	346	185	130	103	101
Sick days lost due to malaria.	5,643	3,162	3,059	1,696	1,476	1,278	1,179
Sickness due to all diseases.	880	353	536	344	343	338	296
Sick days lost due to all diseases.	6,506	4,675	5,024	3,511	3,478	3,479	3,090
Splenic index (children under 10 years).	95	72	47	26	18	7	6
Parasitic index (taken in health).	72	24	48	27	21	1	7
Cost of operation Rs.	Nil	1,561-7-0	Nil	1,089-9-0	4,889-1-0	5,743-6-0	5,770-8-0

Note.—The figures given are for the employees only as the figures for families are variable and cannot be relied upon for accurate comparison.

TABLE
Showing comparative figures of malaria sickness at district board and railway hospital at Barwadih

Particulars	1930	1931	1932	1933	1934	1935	1936
District board dispensary	564	573	511	457	711	710	829
Railway colony ..	585	311	346	185	130	103	101

Just outside our colony is a district board dispensary. Cases from neighbouring villages are treated at this dispensary. The figures of malaria and all other diseases treated there year to year as compared to ours are illuminating. Their figures remain practically constant, inclining, if at all, to an increase while we reduced our malaria incidence by 84 per cent and total sickness by 54 per cent in 5 years.

I am much indebted to Dr. F. E. R. Laborda, Chief Medical Officer, E. B. Railway, for his valuable help in the preparation of this paper. I also wish to show my appreciation for the excellent records kept by my colleague Dr. J. R. Bhatia, Divisional Medical Officer in charge, Barwadih, from 1931 to 1934. My thanks are due to Dr. S. C. Chatterjee, Chief Medical Officer, E. I. Railway, for his permission to publish this report.

A CASE OF MONILIASIS WITH A SECONDARY ALLERGIC PATCH OR 'MONILIIDE'

By L. M. GHOSH, M.B., D.T.M.

(From the Medical Mycology Inquiry, Calcutta School of Tropical Medicine under the Indian Research Fund Association)

A HINDU aged 20 years had suffered from extensive ulceration of the vulva and vagina for the last eight years. She had had various unspecified treatments by different doctors with periodical improvement and remission but was never cured. Two years ago she had a child and since then the disease has become much worse. She was of average build but looked miserable and ill on account of her suffering.

Besides the vulvo-vaginitis there were lesions between the toes and a depigmented patch of exfoliation on the back of the right arm.

Lesions

Both the labia majora were studded with ulcers of varying size. The labia minora also were affected but not so severely; there were only a few small ulcers on them (figure 1). The vagina was also affected. The anterior portion of the vagina had many small ulcers and healed scars and there was a white creamy discharge. The ulcers were mostly small with a red areola surrounding each one, the margins were sharp and the surface was covered with a white creamy membrane,



Fig 1.—Ulcers on the vulva

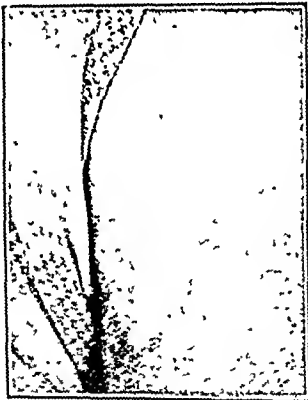


Fig 2.—Allergic patch on the arm; 'monilide'.



Fig 3.—Interdigital lesions of the feet.

underneath which were unhealthy granulations. They were painful and had a whitish discharge. Some of the ulcers on the labia majora were the size of a

four-anna piece or larger, the result of the coalescence of several small adjacent ones. On the left side of the perineum there was a large ulcer. The interdigital spaces in both feet between the third and the fourth toes were affected and the area was covered with white scaling sodden epidermis. This had the appearance typical of 'mangoe toe' (figure 3).

On the back of the right upper arm there was a tightly-scaling depigmented patch about 4 inches by 2 inches. This patch gave no subjective symptoms (figure 2).

Pathological examination

Serapings from the arm showed only slight parakeratosis in the scales and no fungus could be found.

Culture from the same patch on the arm showed no fungus but growth of staphylococci and spore-forming bacteria.

Serapings from the interdigital spaces showed a few yeast-like bodies, common cocci and bacteria.

Smears from the ulcers on the vulva showed numerous gram-positive and gram-negative cocci, bacteria and a few yeast-like bodies.

Culture.—From the feet and from the ulcers in the vulva, staphylococci, gram-negative short bacilli and many small white creamy colonies looking like monilia were isolated and the latter when examined under the microscope showed mycelial threads and budding yeast-like bodies. Two of these colonies were picked up and subcultures made; they were marked A and B. The organisms showed the typical morphology of a monilia having mycelial and budding forms. They were then put through various sugars, peptone water, broth, and litmus-milk, to determine the species.

Four sets of cultures were done in the first series and in all the four the biochemical properties of the colonies A and B were different in that colony B, besides producing acid and gas in the same sugars as colony A, produced in addition acid in lactose, salicin, sorbitol, mannitol and decolorized litmus-milk. The reactions were so constant in all the four experiments that at first it was thought that there were two species of monilia from the same case, colony B being a new species hitherto unreported. To make certain, 24-hour subcultures of both the colonies in a glucose solution were plated out in McConkey's bile-salt lactose agar medium. In plate A all the colonies appeared to be the same and two of these were picked up. But in plate B two types of colonies appeared and two colonies from each type were picked up and subcultures made. The subculture from A and B when stained showed that both the colonies from A were monilia while of the colonies from B two were found to be monilia and the other two were staphylococci. The four subcultures of monilia, two from A and two from B, were again tested for their biochemical properties (table II) and this time they were found to be identical.

In determining the species of monilia Castellani has utilized their properties of producing acid and gas in different sugars as determining factors. Later authors in following him have

TABLE
Two cultures of monilia from the same case—Colony A and Colony B

Dextrose	Levulose	Maltose	Galactose	Saccharose	Lactose	Mannitol	Dulcitol	Dextrin	Raffinose	Arabinose	Adonitol	Inulin	Sorbitol	Mannose	Peptone water	Inositol	Salicin	Broth	Litmus-milk	Colour of growth on dextrose agar
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TABLE I—FIRST SERIES

Four experiments were done and the results were practically the same in all.

A..	AG	AG	AG	AG	AG	O	O	O	AS	O	O	O	O	O	AG	Not done	O	O	Not done	O	White creamy.
B..	AG	AG	AG	A/G	AG	A	A	O	AS	O	O	O	O	A	AG	"	O	A	"	D	White creamy.

TABLE II—SECOND SERIES AFTER PLATING

Four experiments were done and the results were identical.

Monilia paratropicalis, Castellani, 1909.

A..	AG	AG	AG	AG	AG	..	..	..	AS	..	..	..	..	..	AG	C	..	..	CTS	O	White creamy.
B..	AG	AG	AG	AG	AG	..	..	..	AS	..	..	..	..	..	AG	C	..	..	CTS	O	White creamy.

N.B.—A = Acid.

AG = Acid and gas

AS = Acid slightly.

A/G = Sometimes acid and gas and sometimes acid only.

C = Clot in milk and clear in peptone water and broth

CTS = At first clear afterwards slightly turbid.

D = Litmus-milk decolorized.

O = Negative.

All readings were taken up to 7 days.

taken the production of gas with acid as the determining factor and have not taken into consideration the production of acid only without gas—this phenomenon being in their opinion not a constant factor. While I am not in favour of recognizing plurality of species, the production of acid being constant in all the eight experiments this phenomenon cannot be neglected and hence it is considered that this species, is *Monilia paratropicalis*, Castellani 1909 as it produced acid in dextrin which differentiates it from *Monilia tropicalis*.

Discussion of case.—The lesions in the perineal region and the feet were clinically moniliasis; this diagnosis was confirmed by micros-

copic and cultural findings. The patch on the back of the arm was negative for fungi but it improved along with the improvement of the lesions in the other parts, hence I feel justified in considering this patch an allergic lesion, moniliide, allied to those produced by trichophyta and certain bacteria.

Progress.—The patient was ordered to wash the lesions with lysol solution (15 drops to a pint of hot water) twice daily and then to paint with a solution containing gentian violet—5 grains, brilliant green—5 grains, rectified spirit—1 drachm and water to 1 ounce. The lesions responded quickly to the treatment and were quite cured within a month.

A Mirror of Hospital Practice

AN UNUSUAL CASE OF SUBTERTIAN MALARIA

By SUDHIR CHANDRA ROY, B.Sc., M.B., D.T.M.
Kurigram, Rangpur

THE patient was a male aged 28 years.

History.—On rising one morning he could not speak although he could understand what was said. From about 8 a.m. that day, the temperature gradually began to rise and reached 105.8°F. at 4 p.m. when I saw the patient.

On examination it was found that the spleen was enlarged one inch below the costal margin, tongue

slightly coated, pulse very feeble, 150 per minute, regular; bowels constipated.

Immediate blood examination not being possible one blood slide was taken and as malaria was suspected quinine bihydrochloride gr. x was injected intramuscularly. An alkaline diuretic mixture and also a quinine mixture were prescribed.

The blood slide revealed a large number of subtertian rings in every field.

The temperature of the patient next day was 101°F. but there was paralysis of the right lower extremity and marked paresis of the right upper extremity; other conditions about the same as on previous day. Another injection of quinine bihydrochloride, gr. x, was given intramuscularly and mixtures continued.

The next day the condition of the patient grew worse and he began to pass a copious amount of bright-red blood from the bowel. He passed four or five such motions that day. The temperature was 100°F. Another injection of quinine bihydrochloride gr. x was given intramuscularly and four doses of kaolin 3ii of powder were given.

Next day the temperature came down to normal, blood in stool disappeared and pulse condition improved. The patient then gradually recovered.

I had the opportunity of seeing this patient again 4 months after this attack when I found that the paralysis and aphasia were completely cured.

Points of interest in the case :—

Although quinine was given in sufficient amount (gr. 25 daily) from the first day of illness several unusual symptoms made their appearances one after another. These were :—

- (a) Aphasia followed by hyperpyrexia on the first day.
- (b) Paralysis of right lower extremity and marked paresis of right upper extremity on the second day.
- (c) Severe hæmorrhage from bowels on the third day.

PURULENT ARTHRITIS COMPLICATING SMALLPOX

By E. H. WALLACE

CAPTAIN, I.M.S.

Civil Surgeon, Malakand

and

AMIN-UL-HUQ, M.B., D.S.

In-Charge, Lady Minto Hospital, Malakand

THE following five cases are described as it is thought that textbooks do not dwell in sufficient detail upon this deforming complication of a disease so common in India. They were collected from a district where smallpox is endemic and vaccination is not a common practice.

Case 1.—*Act.* 9 years. Discrete modified smallpox one month previously, pox present; ambulatory treatment. Destructive purulent arthritis of both acromio-clavicular joints with continued fever, pain and swelling. Treated by incision into joints which were eroded, glove drain—healed in 29 days. Secondary abscesses formed after one week on anterior part of tibia and vertebral border of scapula, under the periosteum, treated by incision with healing in three weeks. Bi-weekly mercurochrome 10 c.cm. of 1 in 500 intravenously to control pyæmia.

Case 2.—*Act.* 8 years. Discrete modified smallpox two months ago, followed by fever and swelling of both elbow joints. One joint incised by a local barber with consequent total destruction, necrosed ulna apparent in depths of sloughing wound. Arthrectomy of right elbow joint followed immediately by hyper-flexion in plaster of paris. Left elbow put into plaster at most acute angle possible. Right elbow healed by granulation forming fixed ankylosed joint in five weeks. Swelling of left elbow gradually subsided leaving a joint capable of good limited movement. Prontosil and 10 c.cm. of 1 in 200 acriflavine intravenously as adjuvant treatment.

Case 3.—*Act.* 9 years. Modified smallpox six weeks previously. Abscess involvement of right elbow and knee joints. Put into plaster in hyper-flexion and extension respectively immediately. On 11th day right acromio-clavicular joint became swollen and painful

and finally pus was aspirated, incision and drainage was necessary. Left parotitis developed on 23rd day and subsided within five days. Discharged with limited movements of elbow and knee joints after six weeks. Adjuvant treatment with sulphonilamide (Bayer), intravenous mercurochrome and acriflavine.

Case 4.—*Act.* 3 years. Severe discrete smallpox two months ago, blindness of both eyes due to keratitis. Purulent arthritis of right elbow, abscess had burst exposing lower end of humerus posteriorly. Radical arthrectomy required to remove necrosed bone; joint placed in plaster in hyper-flexion immediately, giving an ankylosed joint in six weeks. Following operation there were peri-articular abscesses of both hip and knee and right ankle joints—these were incised and drained and the limbs put into posterior plaster splints; these healed in three weeks giving movable joints.

Case 5.—*Act.* 5 years. Mild smallpox three months ago. Two months after attack right elbow commenced to swell and the abscess burst laterally after three weeks through a double posterior sinus through which the joint could be entered. Radical arthrectomy followed by immediate hyper-flexion in plaster. Healed by granulation in seven weeks, giving a satisfactory arthrodesis.

Summary

1. The actual attacks of smallpox, all occurring in unprotected children under 10 years of age, were mild and discrete, never confluent or hæmorrhagic.

2. Joint complications appeared in 4 to 8 weeks of convalescence and took the form of an initial peri-articular abscess which burst first into the joint and then through the skin.

3. Initial treatment was ambulatory.

4. In treatment one notes the value of immediate immobilization in plaster either following arthrectomy, or before the abscess bursts into the joint in the early stage.

5. Prontosil, mercurochrome or acriflavine intravenously appeared to have no influence on treatment.

A CASE OF GNATHOSTOMIASIS WITH SOME INTERESTING FEATURES

By P. A. MAPLESTONE, D.S.O., D.S.C., M.B., B.S., D.T.M.

and

S. SUNDAR RAO, L.M.P.

(From the Helminthological Research Laboratory, School of Tropical Medicine, Calcutta)

THE first instance of a gnathostome infection of a human being in India was reported by Maplestone (1929), and since that time the same worker has recorded three more.

The same man, in whom the first recorded infection occurred, came recently with a similar condition again. Before discussing the history of the present manifestation it is thought advisable to recapitulate briefly the main points in the first infection.

He is a Mahomedan clerk who was at that time 26 years of age. He had lived in the Jalpaiguri district of Bengal for many years prior to the attack and had never been out of the province in his life. For a period of about seven years he had suffered with transient swellings in various parts of the right hand, which in the

final attack was localized in the middle finger. The man noticed a small whitish point beside the nail and when this was opened with a needle a small worm escaped. This worm was identified as a gnathostome and described by Maplestone (*loc. cit.*). After the worm had been removed the swelling of the hand ceased altogether. The patient was not seen by us on this occasion, but the case notes and the worm were forwarded by the civil surgeon, Jalpaiguri.

In the intervening ten years this man has remained all the time in the same district, and he recently reported at the out-patient department of the School of Tropical Medicine, Calcutta.

He gave the following history :—

In 1930, about a year after the first worm was removed and all attacks of swelling of the right hand had ceased, he noticed an oedematous swelling on the left side of the chest, just above and inside the nipple. This swelling soon subsided and shortly afterwards another one appeared over the sternum, which remained until 1936. It then disappeared and in 1937 a third swelling appeared on the right side of the chest. During 1938 transient swellings occurred in various parts of the right arm, finally reaching a position just above the right wrist. At the beginning of May this year (1939) the right forearm became swollen and subsided in about a week. On 29th May the right middle finger swelled, and he came to Calcutta where he was seen by us on 2nd June. He had a blister on the pulp of the finger. This was incised and a small worm together with a few drops of serum escaped.

The worm was found to be not unlike the one removed from the same patient ten years earlier. This specimen was better fixed than the previous one so that there was no shrinkage, which fact may account for its slightly larger size, but apart from this the stage of development was no further advanced and there were the same number of rows of spines (four) on the head bulb.

	Old specimen	New specimen
Length ..	3.56	5.28
Maximum diameter ..	0.42	0.54
Diameter of head bulb ..	0.34	0.33
Length of head bulb ..	0.20	0.22

(Measurements in millimetres.)

This case presents several interesting features, which are discussed below.

The infection seems to have persisted much longer than has ever been recorded before. Although it cannot be proved it appears probable that infection with both worms was acquired at the same time, because the disease is such a rarity in India the chances of the same man being infected on two different occasions appears very remote. If this is accepted it gives a minimum of 17 years that these worms have lived in the body of the man.

The worms do not appear to have undergone any development over this long period as the two worms, removed with an interval of ten years between, are in the same stage of immaturity. This is all the more interesting because some gnathostomes that have been removed from human beings have shown sufficiently advanced development to have been classed as

adults. Therefore there must be factors other than of time which determine the development of these worms in the human tissues.

It is a remarkable coincidence that both worms finally reached the surface near the tip of the same finger after extensive migration through the body.

The man said that on very rare occasions he has eaten uncooked dried fish which may account for his infection.

REFERENCE

Maplestone, P. A. (1929). *Indian Med. Gaz.*, Vol. LXIV. p. 610.

'PRONTOSIL ALBUM' IN ILIAC ABSCESS

By S. B. SEN GUPTA, L.M.F.

and

M. ALI, L.M.F.

Berch Tea Estate, Hasimara, Jalpaiguri

T. D., aged about 6, a female child, was brought by her father. She complained of pain in the left iliac region for the last eight days during walking and could not extend her leg fully and was not able to stand on that side. She also had irregular daily rise of temperature. She developed this after she had one small boil on her left buttock which gave her trouble for about seven days. On examination of the part an abscess was found in the left iliac fossa. We advised absolute rest in bed. We gave her 'Prontosil album', 1 tablet 4 times a day, and alkaline mixture with potassium iodide t.d.s. for 10 days. Antiphlogistine was applied locally. During the course of treatment she showed remarkable improvement in all respects and at the end of the third week of treatment she was completely recovered.

We are indebted to Dr. W. G. Cattell, for his kind permission to publish this note.

NEGLECTED COMPOUND FRACTURE OF THE TIBIA

By D. N. KARMOKAR, L.M.F.

Assistant Medical Officer, Rajmai Tea Estate, Upper Assam

A TEA-GARDEN coolie boy, aged about 9 years, while staying in a distant bungalow with one of his relations, fell from a mango tree about 8 months ago and got a compound fracture of the left tibia.

In the latter part of April, he was brought home by his parents and on the 1st May he came to the hospital on foot for treatment.

The affected leg was found to be slightly curved, with a fairly clean wound on the anterior surface, through which the upper part of the lower fragment of the left tibia protruded for about an inch and on further examination this fragment, which was about 3½ inches long, was found to be loose. This was subsequently pulled out without any difficulty, leaving a sinus about 3 inches in depth. As the parents refused any operative measures on the child, the sinus was dressed with iodoform gauze and it healed up within four weeks.

It is remarkable that the boy had a compound fracture of the tibia and without treatment he got no generalized sepsis or tetanus and could follow his ordinary daily pursuits without difficulty.

Acknowledgment

My thanks are due to my chief Dr. J. C. Paisley for his valuable advice in the management of the case.

Indian Medical Gazette

AUGUST

ASEPSIS IN THE OPERATING THEATRE

It is a good thing to have our complacency disturbed from time to time. Recent investigations on asepsis in the operating theatre will give surgeons considerable food for thought and lead, we hope, to some close questioning on the routine methods of sterilization of dressings and instruments in their own hospitals. Most surgeons have had experience of a temporary break-down in the asepsis of their theatres, evidenced by a series of wound infections after 'clean' operations. A general tightening up of the theatre management has usually ended these incidents, and, whilst some unfortunate person has received the blame for an actual or supposed, but often minor, lapse from aseptic or antiseptic ritual, the real cause of the trouble has seldom been ascertained.

Some years ago doubt entered the mind of Col. Hayes of the Lady Willingdon Hospital, Lahore, as to the efficiency of the usual methods adopted for the sterilization of dressings, towels, etc. He first reviewed his own knowledge on the subject and found it was rather vague; he questioned his colleagues and found that their knowledge was equally sketchy. He then investigated more closely the sterilizing procedures at his own, presumably, and at other similar institutions, and found, that, whilst all the surgeons were satisfied that the sterilization was carried out properly, few had any knowledge of the details, that the sterilizing procedure was not usually supervised by a responsible person and seldom by a sister, that the packing of the drums was left to young and inexperienced probationers, that the procedure for operating the steam sterilizer was governed by the manufacturers' instructions, and that even these were sometimes misunderstood.

Accepting 115°C. for twenty minutes, which will kill tetanus spores, as the ideal to be achieved, he estimated by means of a thermometer which he placed inside the drums the time interval, in various circumstances, before this temperature was reached; he found that in many circumstances the temperature of 115°C. was not even achieved during the sterilization procedure laid down by the manufacturers of the sterilizers used, and that in every instance there was a time lag which had not been sufficiently allowed for in the manufacturers' instructions, so that when these are followed this temperature (115°C.), even if it is ever reached, is not maintained for a long enough period (*B. M. J.*, 1937, i, 911).

The fact that you cannot accept the pressure gauge as a substitute for a thermometer was

further emphasized by Rishworth who has pointed out that the correlation tables between pressure and temperature usually employed are based on experiments with pure steam, but that, as in practice there is very incomplete exhaustion of air, these correlation tables cannot be applied. He reproduced from Underwood's *Textbook of Sterilization* two most instructive charts, one showing the extremely low temperature reached, even after 70 minutes, when no air has been discharged or when air has only been partially exhausted, and the second showing the differences in the temperature in various parts of the sterilizer; from the latter it can be seen that, when the pressure gauge has been recording, inferentially, a temperature of 250°F. for as long as twenty minutes, in the presence of air, the temperature in the lower part of the sterilizer has only reached a nice fever heat in which most micro-organisms would thrive. The morals he gathers from this are that there should be some means of reading the actual temperature inside a packed dressing drum near the bottom of the sterilizer and that the air outlet should be at the bottom, and not at the top as it is in many types of sterilizer (*B. M. J.*, 1938, ii, 974).

These two papers read in conjunction with Pulvertaft's (*B. M. J.*, 1937, i, 441) bacteriological study of 'sterile' accouchement sets (put up by well-known and reputable firms) from a very high percentage of which he was able to recover *Clostridium welchii*, *Cl. tetani* and *Cl. sporogenes* should shake the faith of surgeons and gynaecologists who have in the past accepted unquestioningly the unopened drum and the packed 'sterile' dressing. But these are not the only source of sepsis in the operating theatre. In a recent paper in the *Lancet* (1939, i, 1088) Devenish and Miles have reported an investigation to discover the cause of a series of *Staphylococcus aureus* infections of 'clean' operation wounds in a London hospital. The source of the infection in this instance was the surgeon's hands, through punctures in his rubber gloves. Of two surgeons operating in the same theatre, one did 141 'clean' operations of which 20 suppurated and the other did 84 of which one suppurated: the former was a 'skin carrier' of *Staph. aureus*. In normal circumstances punctures in gloves were found in 24 per cent of instances and after very careful precautions this percentage was reduced to 14. In these improved circumstances, though a rich culture of *Staph. aureus* could still be obtained from inside his gloves at the end of an operation, the former surgeon performed a series of 35 clean operations without any suppuration occurring, which suggests that the leakage of staphylococci in sufficient dosage to cause an infection does not always occur, even when holes are present in the gloves, and other routes were suggested.

Now, to complete the surgeon's discomfort, Brewer (*J. A. M. A.*, 112, 2009) has shown that

the claims made regarding the sterilizing powers of certain well-known mercurials are dependent upon unsound methods of bacteriological investigation. He found that in a series of 120 surgical operations the cutting instruments

revealed 12 per cent contamination with spore-forming anaerobes, and that eight per cent of the knives used for making the skin incisions were contaminated with *Clostridium welchii* or similar organisms.

Special Article

LEPROSY AND TUBERCULOSIS

A lecture delivered to the post-graduate course in tuberculosis organized by the King George Thanksgiving (Anti-tuberculosis) Fund, Calcutta, February 1939.

By J. LOWE, M.D.

Research Worker under British Empire Leprosy Relief Association, Indian Council, and Officer-in-charge, Leprosy Research Department, School of Tropical Medicine, Calcutta

I ATTEMPT in this lecture to discuss some of the ways in which these two diseases resemble each other or else differ from each other.

Ætiology

Both these diseases are caused by organisms which are classified under the group 'mycobacterium'. It might be interesting for a moment to go back to the early days of bacteriology and remind ourselves how these two bacilli were discovered. In the seventeenth century, Kircher had stated in a primitive way the theory of contagion and infectious disease. A little later van Leeuwenhoek had seen bacteria, bacilli and spirilla in smears taken from the teeth, but he did not connect such bodies with disease. It was nearly a century later that von Plenciz advanced the idea that minute bodies might convey diseases from person to person and that each infectious disease had its own causative agent, but he did not state what these agents could be. Nearly three-quarters of a century later still, these early theories began to bear fruit. In 1836 Schwann showed that putrefaction was caused by a living body which could be destroyed by heat. About the same time the nature of yeasts was discovered. In 1840 Henle surmised that disease was spread by living infective bodies. In 1846 Klenche showed that tuberculosis could be transmitted in some unknown way by cows' milk, and twenty years later Villeman showed that tuberculosis was caused by an invisible living agent which was transmissible. In the same year, 1865, Davaine discovered the bacillus of anthrax in sheep. In 1870, bacteriology was in its early infancy. Few people believed that bacteria had anything to do with disease. Diseases were attributed to all kinds of other causes and no bacteria pathogenic to man had been seen or described.

In 1870, a young man, Armaur Hansen, was studying leprosy in Norway. He concluded that leprosy was infectious and was probably caused

by a micro-organism, and he was searching in microscope preparations made from leprosy lesions for the causative organism of the disease. He had poor microscopes compared with our modern instruments, and he had no aniline dyes with which to stain the bacilli. He stained the specimens with osmic acid and he saw bodies which he thought must be the organism of leprosy. This was the first organism to be reported as occurring in the tissues of man. This was one of the great landmarks of medicine and an achievement for which full credit has not been given to Hansen. Hansen published his results in 1873 and practically no one believed him. His preparations were not good enough to convince the sceptics.

In the same year, 1873, a young doctor, Robert Koch, was working in a country practice in Germany after serving in the Franco-Prussian war. In his spare time he studied the bacillus of anthrax which had been discovered in sheep 8 years before. He observed and described the different forms of this organism and its development. A few years later, while still doing country practice, he studied the staining of bacilli by aniline dyes which had recently been used in histology, and found that bacteria stained very well with these dyes.

Later, Hansen adopted Koch's method of staining bacilli and was able to make preparations of the leprosy bacillus so good that the sceptics were convinced and Hansen's bacillus assumed its proper place as the cause of leprosy.

A few years later Robert Koch, now an officer of the Imperial Health Department of Germany with a laboratory and staff at his disposal, turned his attention to tuberculosis and was able to demonstrate a bacillus practically identical with Hansen's bacillus.

Thus, in the early days of bacteriology leprosy research and tuberculosis research helped each other and so we hope will continue to help each other. Koch cultured the organism of tuberculosis and infected experimental animals and thus opened a vast field for research. The leprosy bacillus which was discovered first was soon left far behind and the bacillus even to-day has probably not been cultivated and no experimental animal has been infected. All attempts to apply to the organism of leprosy the refinements of cultural technique which have been worked out so thoroughly in tuberculosis have so far failed.

Immunology

As the result of developments in bacteriology there have been developments in knowledge of immunology of these two diseases. In tuberculosis we have various forms of the tuberculin test the most useful of which is the Mantoux test. It is interesting to note that in leprosy we have rather a similar test, the leprolin test. Leprolin is prepared not from cultures, because we have none, but from leprous lesions themselves. There are certain important differences between the leprolin test and the tuberculin test, but I cannot discuss these now.

In tuberculosis much work has been done in recent years on complement fixation and similar work has also been done in leprosy. For complement fixation in leprosy we find that the best available antigen at the present moment is what is known as the WKK antigen which is prepared from tubercle bacilli, and there is considerable evidence to show that the immunological reactions of these two diseases have very much in common and that the two bacilli are antigenically related.

Transmission

In transmission, however, we find that there are considerable differences between the two diseases as well as certain similarities. Let us deal with the differences first.

Tuberculosis is transmitted either by inhalation or by ingestion of tubercle bacilli. There is however no proof that leprosy can be transmitted by either of these methods, and it seems most likely that it is transmitted by inoculation of bacilli into broken skin or mucous membrane.

Let us consider resemblances in transmission. Leprosy and tuberculosis are both very often diseases of families, and in both diseases, in the past the possibility of intra-uterine transmission has been discussed. In leprosy it has been shown that a leprous woman whose tissues may teem with lepra bacilli can become pregnant and bear a child, and that lepra bacilli may be numerous in the placenta, may be found in the umbilical cord, and even occasionally in the tissues of the new-born child, but that, if the child is separated from the mother at birth, it does not develop leprosy. I believe that similar findings have been made in tuberculosis and it appears that neither of these two diseases can be transmitted *in utero*.

Another point in which the transmission of the two diseases is similar is in the case with which they are transmitted to children and young people and the relative difficulty with which they are transmitted to adults. This is a matter about which I shall say more later.

Clinical and pathological findings

Clinically, there are of course very marked differences between leprosy and tuberculosis. Tuberculosis affects the internal organs very much more than leprosy, which affects chiefly the skin, nerves, and mucous membranes.

Leprosy does affect some of the internal organs but only to a relatively mild degree. It is, however, interesting to note that the two internal organs most commonly affected in tuberculosis, namely, the lung and the intestinal tract, are rarely if ever affected in leprosy.

It is in the skin that leprosy may produce lesions very much like the lesions of skin tuberculosis or the tuberculide. These leprous lesions in the skin resemble so closely the skin lesions of tuberculosis that they have been called tuberculoid leprosy, or leprides. There are, however, certain clinical differences, the most important being that in the leprous lesions of this variety there is impairment of skin sensation and often thickening of cutaneous nerves supplying the patch. This nerve thickening may extend up to the nerve trunk. When you get a case of suspected tuberculide you should consider whether it may not be due to leprosy. Test the sensation of the skin of the patch and examine for thickening of nerves.

When leprous lesions of this variety were first described, some workers refused to believe that they were due to leprosy and thought that they were tuberculous lesions occurring in a leper. Now, it is generally accepted that they are due to leprosy. In some countries they are apparently much more commonly seen than in other countries, in India they are very common indeed.

Another way in which the clinical aspects of these two diseases show some resemblance is in the occurrence in both diseases of allergic reactions with a temporary increase in the signs and symptoms.

You will have heard about allergic reactions in tuberculosis and their significance, how they may produce a temporary increase in the clinical signs, and how the occurrence of these reactions is not necessarily a bad sign for in some cases (but perhaps not in all), allergy goes hand in hand with immunity, and allergic reaction may be followed by quiescence and arrest of the disease. Similar reactions are also seen in leprosy and they may produce alarming symptoms which, however, always subside in time without any special treatment. These reactions are not infrequently followed by long inactivity and sometimes by arrest of the disease. The failure to recognize allergic reactions in both leprosy and tuberculosis, and the failure to attribute to these reactions their proper significance, is one of the commonest causes of errors of clinical judgment in dealing with these two diseases.

Another way in which the two diseases resemble each other is by the occurrence in both of them of cold abscess. Tuberculous cold abscess and its features are well known to every one, but not many clinicians know that leprosy may cause cold abscess.

It is in the type of leprosy which has been called tuberculoid that cold abscess is sometimes seen. It occurs in nerves, sometimes in the cutaneous nerves supplying tuberculoid lesions

in the skin, and sometimes in nerve trunks. In cutaneous nerves it occurs in the form of small round or oval swellings which may be multiple. In nerve trunks it occurs first in the form of a fusiform swelling usually single, but as the process of caseation progresses the cold abscess may burst through the nerve sheath and form round or oval encapsulated swellings alongside a nerve which may attain the size of a hen's egg, or may track quite a long distance down a limb. Such abscesses sometimes discharge through the skin.

While I am discussing the clinical aspects of the two diseases I might emphasize the fact that leprosy itself rarely causes death, and that particularly in leprosy institutions, one of the commonest causes of death is tuberculosis of the lungs. Thus, you may have leprosy and tuberculosis in the same patient and this may cause a little difficulty in correct diagnosis. It should be remembered that in advanced cases of leprosy, lepra bacilli may be found in the sputum and in the faeces. They usually come not from the lungs but from the mucous membranes of the larynx, pharynx and the trachea. Thus, acid-fast bacilli in the secretions and excretions of a leper may be lepra bacilli or they may be tubercle bacilli. It is impossible to differentiate one from the other merely from the appearance of the individual bacillus, but the fact that lepra bacilli are usually more numerous and occur in masses may be of assistance. Also it is to be remembered that in such cases definite signs in the lung are usually caused by tuberculosis, for leprosy rarely if ever affects the lung.

In some cases, however, guinea-pig inoculation of bacilli is necessary for accurate diagnosis, the guinea-pig not being susceptible to the leprosy bacillus.

Epidemiology and Control

I will now discuss certain points in the epidemiology of these two diseases. Some striking resemblances and some marked differences will be seen. Modern thought has emphasized the idea that all diseases tend to occur in epidemics. They are introduced into a community; they spread to begin with usually in a relatively severe form; the incidence rises to a peak and then declines, the diseases appearing in a mild form, and finally the epidemics die out, though further epidemics may occur later. The factors causing this decline of epidemics are very uncertain.

The acute diseases have short epidemic periods, perhaps only a few weeks or months, e.g., cholera, plague. The more chronic diseases have longer epidemic periods. It is suggested that tuberculosis, a chronic disease, has a very long epidemic period, possibly two or three hundred years or more from start to finish. What evidence is there to support this view of the epidemic nature of tuberculosis?

A study of tuberculosis in western Europe gives us the following ideas:—

(a) Tuberculosis has been declining in western Europe for many years. The mortality rate in England and Scotland has fallen 75 per cent in the last 50 years.

(b) It appears almost certain that the decline started long before the infectious nature and mode of transmission of the disease were generally realized, long before the bacillus was discovered, and long before any anti-tuberculosis work started. The decline started and continued during the period of rapid industrialization which would seem to favour the spread of tuberculosis.

(c) Although anti-tuberculosis work has not caused the decline, it has probably accelerated it markedly, and it is noteworthy that the temporary deterioration in environmental conditions and the temporary hold up of preventive work which occurred during the European war was accompanied by a temporary increase in the tuberculosis rate. This is a strong indication of the value of hygiene and anti-tuberculosis work, but the decline is due largely to other factors, some of which are beyond control.

The following factors have been suggested as tending to produce a decline in the tuberculosis incidence:—

(1) Increase in racial resistance caused by the elimination by death of susceptible stock, (2) the fall in the birth rate and the increased length of life with marked changes in the age distribution of the population, children forming a very much smaller proportion of the population than in the past. The morbidity and mortality rate of tuberculosis is always highest in young people but if the young people in the population are few, the tuberculosis rate falls correspondingly. (3) Marked improvement in social and hygienic conditions, nutrition, housing, etc.

These ideas have frequently been expressed about tuberculosis in western Europe. I now want to ask the question, 'Does leprosy occur in epidemics which decline spontaneously as the result of factors largely beyond control'?

There is undoubtedly some evidence that it does. When we study the history of leprosy we find that Europe experienced an epidemic which lasted in all for over 1,000 years. In the thirteenth century, leprosy was probably about as common in England as it is in India to-day, but 400 years later it had almost disappeared. All kinds of reasons have been given for this strange phenomenon, but none of them is satisfactory and it seems probable that it was the natural decline of an epidemic possibly accelerated by segregation of lepers and by improved social and hygienic conditions and nutrition. Now let us consider India. Are these diseases occurring in the form of long-period epidemics and if so at what phase of the epidemic are we at present?

When considering this question it should first be stated that the same disease may occur in

different forms in different parts of the world. In some places, plague, for example, appears in epidemic form and then disappears entirely, while in other places it is persistently endemic. The same may possibly be true of leprosy and tuberculosis; they may be epidemic in some parts and persistently endemic in other parts. What can cause these differences is not clear.

There are, however, some indications that these two diseases are occurring in India in the form of long-period epidemics, and there are certain things which suggest that the epidemic of leprosy may be past its height, while the epidemic of tuberculosis may be now on the up grade. The available evidence is based on information concerning the incidence and severity of the two diseases.

Let us first consider leprosy. Statistics in India are very inadequate and unreliable, but such as they are, they do not suggest that the incidence of leprosy is increasing in India as a whole. The number of lepers reported in India in the census of 1871 was about the same as was reported in 1921 in spite of the very large increase in population during this period. (Recent census figures are nearly 50 per cent higher probably as the result of more accurate enumeration.) Another point is that work in recent years has shown, I think, conclusively, that the average case of leprosy seen in India is much milder than the average case seen in some other countries. These two facts, the mild form of the disease and the available statistical evidence, poor though it is, suggest that leprosy may be past the epidemic peak and may be on the downward grade. This does not mean that anti-leprosy work is not needed in India. On the other hand it may mean that conditions are favourable and that we may be able to accelerate any natural tendency in the decline in the leprosy rate.

Let us now consider tuberculosis, its incidence and severity. Here the evidence appears to point in a very different direction. Available statistics again are very poor but the indications are that tuberculosis is increasing, and increasing markedly in some parts of the country. Evidence regarding the severity of the disease in Indians as compared to other races is very limited. I can quote a very limited personal experience of tuberculosis in up-country people and in them I was astonished at the rapidity with which the disease developed and often proved fatal. Other doctors who have seen tuberculosis in India and in Europe have had similar experiences.

Benjamin (1938) has recently published an analysis of 2,158 cases in Indians. His conclusions are that tuberculosis in Indians 'is of a very serious type; it is acute, rapidly developing with little tendency to show a natural resistance and healing'. 'There is a severe exudative reaction, followed by a rapid breaking down of tuberculous tissue, with resulting cavity formation'. It should be stated that Frimodt-

Möller reports that the results of treatment of tuberculosis in Indians are quite comparable to the results obtained in Europe.

This evidence, inadequate though it is, suggests that in India the tuberculosis epidemic may be on the upward grade. If so, it means that India is facing a very serious situation and that preventive work is a vital necessity.

I will now discuss briefly some of the factors which have apparently influenced the spread of leprosy in the past and which may now and in the future influence the spread of tuberculosis in India. One important factor which has undoubtedly influenced the spread of leprosy in various parts of the world has been the development of communications, with migration of large bodies of people from one area to the other or from one country to the other, the development of commerce and industry and the recruitment of labourers from distant areas. In this way leprosy has spread from one country to another and from one part to another of the same country. In modern times industrialization has had its influence and there are indications that this factor is operating in spreading leprosy in certain parts of India. People are migrating from areas where there is little or no leprosy, to industrial areas where they mingle with other people from areas where there is much leprosy. They get infected, develop leprosy and then return to their villages and introduce the disease there. Even when an industrial population is permanently resident in an area, the concentration of people and bad housing may help the disease to spread, but when the industrial population is largely migratory, as in India, the danger is much magnified.

These things apparently influence the spread of leprosy and I think that undoubtedly they are influencing the spread of tuberculosis also.

It may, however, be argued that in western Europe the period of intense industrialization was accompanied by a decline in tuberculosis. I would point out, however, that there are three great differences between India and Europe in this respect. Firstly, industry developed in Europe when tuberculosis was apparently already at its peak and possibly on the decline. This is not so in India. Secondly, the industrial population in Europe is not largely migratory as in India. Thirdly, in Europe the development of industry was accompanied by the development of reasonably effective public health work and social hygiene in its wide sense, and also by a rise in the standard of education. I fear that we cannot yet say the same of India. Therefore, I think that the influence of industrialization on the spread of tuberculosis may be much more marked in India than it has been in Europe.

I have mentioned above some points about leprosy and tuberculosis in communities and large groups of people. Now I will briefly discuss the question of leprosy and tuberculosis in

small groups of people, in other words in families.

A study of leprosy in families shows that of young children living in contact with open infectious cases, a high proportion, sometimes between 50 and 80 per cent or more, sooner or later develop signs of the disease, and the disease tends to be severe; whereas of adults living under similar conditions, only about 5 per cent develop the disease, and the disease is often in a mild form. These findings indicate that children are more susceptible to leprosy than adults and that most serious infections are acquired early in life. Even when the disease appears relatively late in life it is often the result of an infection acquired early in life, an infection which has long lain latent.

I believe that similar studies of tuberculosis in families have given somewhat similar results. It is found, for example, that if a mother is an open case of tuberculosis, she may infect child after child and the children often get severe tuberculosis, but the husband who is living with such a wife usually does not get the disease at all, or else gets it in a relatively mild form. These facts show the relatively high degree of immunity in adults. I have been interested to read that an increasing number of workers on tuberculosis is tending to regard adult tuberculosis as often being the late result of an infection acquired in childhood, although some workers think differently. At any rate it is clear that adults get the disease much less readily than children, although the difference may not be so marked in India as it is in Europe.

The relative immunity of adults to tuberculosis is usually attributed to repeated subliminal infections early in life. It is however very difficult to explain the relative immunity of adults to leprosy on this basis. It appears to be a common natural development with age.

These facts about leprosy and tuberculosis are being more widely recognized, and this is reflected in a strengthening of the emphasis laid on the prevention of infection of children.

In leprosy you may have your diagnostic and treatment centres, your leper colonies and so on, but unless provision is made for the isolation of open cases of leprosy from children, such measures are not likely to have much influence on the spread of the disease in the community, and may even do more harm than good. For example, a leper colony with married quarters and with no proper arrangements for separation of children, as is sometimes found, may become a breeding place for lepers.

I think that the same thing may be true of tuberculosis. You may develop your tuberculosis clinics, your sanatoria, and your educational and propaganda work in the homes of the patients and in the population at large, but as long as the prevention of infection of children and young people is not attempted it will be difficult to accomplish much in the control of

tuberculosis in the community. I have seen an Indian mother with chronic tuberculosis, an open case, infect 5 children one after another. This is a very difficult matter to deal with properly. The average Indian house is too small and the average family too big and too poor to allow of reasonable arrangements to protect children and young people from infection by an open case in the house.

It seems to me that one great hope for the future lies in the direction of the development of some method of immunizing young people exposed to infection. There is of course the B.C.G. vaccine. Opinions regarding its efficacy are very divided. The development of work on the subject has been greatly handicapped by the terrible tragedy in Germany a few years ago when virulent cultures were accidentally substituted for B.C.G. vaccines, with a high mortality in the vaccinated children. At any rate it is now clear that the vaccine does no harm, and numerous competent workers are convinced of its value. A summary of the findings made in studies of the use of B.C.G. vaccine by Nègre and Goyal (1938) have recently been published. It is worthy of note that some large industrial concerns in Europe who recruit Indians for training in Europe and for future work in India, insist on such workers being vaccinated with B.C.G. before going to Europe. If further work demonstrates clearly that B.C.G. vaccine or some modification of it does produce immunity, then I think that there should be a vast field for the application of this measure in India for the immunization of contacts and of workers in industry. I only wish that in leprosy there was any prospect or hope, however remote, of the development of some similar method of immunizing to leprosy those who are exposed to infection.

I have given you some of my ideas about these two diseases, the 'twin diseases' as they have been called, leprosy and tuberculosis. My knowledge of tuberculosis is very limited and some of my ideas about this disease may be wrong. I do hope, however, that I have been able to do one thing, namely, to show how tuberculosis and leprosy are linked together and to the whole realm of medicine and public health. What does this mean in practice? It means several things. It means, firstly, that those of us who are specialists in one subject should keep in touch with other subjects, particularly allied subjects, and as far as possible with the whole realm of public health work. It means secondly that anti-tuberculosis and anti-leprosy work and other similar activities should not develop entirely independently of public health activities in general. They may be started by special organizations but they should keep in touch with general public health work and in course of time they may be incorporated in them. Thirdly, it means that the public health system should ultimately include anti-leprosy and anti-tuberculosis work as an integral part of itself. There

is far too often a tendency on the part of medical and public health authorities to regard these two diseases, and particularly leprosy, as something apart from their general sphere. I hope that as time goes on this tendency will get less, that medical schools and colleges would really give good instruction in these subjects, that practising doctors in whatever sphere they happen to work, will have the necessary knowledge, and will regard the diagnosis and management of cases of these diseases as an essential part of their work, with of course advice from experts when necessary. I hope also that public health

workers will regard anti-leprosy and anti-tuberculosis work in the same way. Real progress towards the solution of both these problems, leprosy and tuberculosis, can only be made when every doctor has become alive to their importance, and has the necessary knowledge to play his part, a most important part, in the work.

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Medical News

TUBERCULOSIS NEWS FOR THE MONTH OF MAY 1939

ON account of the amalgamation of the King George Thanksgiving Fund into the Tuberculosis Association of India the Hassan Masud Suhrawardy Memorial Challenge Shield Competition which since 1932 was organized by the Fund will in future be held under the auspices of the Tuberculosis Association of India.

The competition will be open to any corporation, municipal council, municipal committee or district organization in British India or an Indian State doing anti-tuberculosis work, or any other organization, association or committee, not being larger than a district organization, which is doing anti-tuberculosis work in any of the said territories, which the central committee of the Association may from time to time admit to be eligible.

His Excellency the Governor of the N.-W. F. P. laid the foundation of a tuberculosis sanatorium at Daddar on the 11th May. The sanatorium provides for 70 beds and includes 10 beds for females. It is understood the institution is being modelled on the lines of the Union Mission Tuberculosis Sanatorium at Madanapalle.

The Bombay Tuberculosis Association has been formed with H. E. the Governor as Patron and the Hon. the Prime Minister as President of the Association.

Bombay collected Rs. 7,01,548 for the King-Emperor's Anti-Tuberculosis Fund while Ahmedabad organized a separate appeal for anti-tuberculosis work and collected Rs. 1,82,000.

In allocating funds for future work, the Association has decided to invest Rs. 2,00,000 as permanent endowment for the Provincial Association. Rs. 2,00,000 have been invested in the name of the Bel-air Sanatorium, Panchagani, and the interest thereon will be paid to this institution so long as it continues as a charitable institution and admits free patients. The Bombay Municipality on agreeing to enlarge the accommodation in the Turner Sanatorium from 40 to 80 beds, has been given Rs. 60,000 to meet one-half the cost on capital expenditure. Rs. 60,000 have been earmarked for building and equipment of clinics near the teaching hospital and the municipality and the governments have been approached on the subject. Rs. 98,190 have been allocated for clinics in the districts.

The Italian Fascist National Federation against tuberculosis has placed at the disposal of the International Union against tuberculosis six scholarships at the 'Carlo Forlanini' Institute in Rome. The Tuberculosis Association of India, who is a member of the International Union, has been invited to recommend names of young physicians already familiar with tuberculosis problems.

These scholarships, of a value of 2,000 lira respectively, plus board and lodging will be tenable for one academic year (from 15th November to 15th July) including the usual holiday periods.

The kind of work undertaken at the institute will be subject to an agreement between the director of the institute and the candidate.

The Executive Committee of the International Union against Tuberculosis on which India is represented through the Tuberculosis Association of India places at the disposal of the Governments and Associations belonging to the Union a biennial prize of a value of 2,500 French francs, in memory of the late Professor Leon Bernard, who was the Founder and, for fourteen years, the Secretary-General of the Union.

This prize will be awarded for the second time in the year 1940 to the author of an original essay on 'Conjugal Tuberculosis', in French or in English.

The essays must be typewritten or printed and must not exceed 10,000 words. They must be forwarded to the Secretary, The Tuberculosis Association of India, 20, Talkatora Road, New Delhi, not later than the 1st March, 1940. Essays approved by the Association will later be forwarded to the Executive Committee of the Union.

Should the Executive Committee decide that no essay submitted is of sufficient merit, the prize will not be awarded in 1940, but will be offered again in the following year.

ASSAM MEDICAL COUNCIL

AN Ordinary General Meeting of the Assam Medical Council was held on Monday, 8th May, 1939, in the Office of the Inspector-General of Civil Hospitals, Assam, Shillong.

On taking the Chair, the President addressed the Council as follows:—

'Gentlemen, I welcome you once more to the deliberations of the Assam Medical Council, and I take this opportunity of making a few general observations on the agenda which is before you.'

During the past year, since the last session of the Council, one important matter has remained over for consideration and another has presented itself for the first time. The former refers to the question of "covering", regarding which you will remember that the council came to no final decision at its last session. Since then I have examined the matter, to the best of my ability, from every point of view, and I shall ask you to-day to come to a final decision on the matter. As the question is an important one, it will perhaps be desirable to place before you what appeared to me to be the underlying facts and arguments which, in due course, I shall ask you to consider.

The most important point at issue is evidently the implication of the word "covering", and in interpreting this word it is, I think, essential to consider the different conditions which prevail in the United Kingdom, where the use of the word originated, and in Assam, where the use of the word has been copied, as in most of the

Provincial Medical Acts or in the Codes of Medical Ethics framed under them, without, apparently, any clear idea of its real implications. The most important difference between India and the United Kingdom in this respect is in the legal position of registered practitioners. An examination of the Assam Medical Act makes it quite clear that there is nothing illegal in unqualified practice in Assam, nor, I believe, at present, in any other part of India. The extent of this freedom to practice is evidenced by the fact that any person, trained or untrained, can represent himself to be a doctor, whether he practises an indigenous system of medicine, or whether he practises on western lines or so-called homœopathy. There is nothing under the Assam Medical Act to prevent such persons from practising, provided that they do not represent themselves to be the registered medical practitioners, and the chief restrictions to which they are subjected are that they may not hold appointments under Government or under local bodies and that no certificate which they may issue, which is required by any Act of the Legislature, is valid in a court of law.

The insignificant effect of these restrictions as limiting practice is evidenced by the fact, with which you are no doubt familiar, that, in the larger cities of India, a certain number of graduates of the recognized Universities such as Calcutta, Bombay and the Punjab, deliberately refrain from registration under any Medical Act in order to avoid subjecting themselves to whatever measures of professional discipline the several Medical Acts prescribe, and they are thereby enabled, to their financial advantage, to ignore with impunity all the ethical principles governing advertising, association with firms of chemists, and the like. In these circumstances it is evident that there is nothing illegal in the employment, by tea gardens, of unregistered practitioners and no legal bar to the practice of their profession by unregistered practitioners, provided they keep clear of the law in the matter of the issue of certificates and otherwise and refrain from representing themselves to be registered practitioners.

The position in the United Kingdom is, I think, fundamentally different. What constitutes "covering" in the United Kingdom, as set out in the warning notices of the General Medical Council, is, in essence, an act which is (a) fraudulent, because a registered medical practitioner, by his countenance and assistance, enables an unregistered man to practise as a doctor, which otherwise would be illegal, and (b) objectionable on the grounds of public safety. I cannot satisfy myself that either of these principles can be said to apply in India, because, on the one hand, there is nothing illegal in these unregistered men practising their profession, nor, on the other hand, can it be assumed that the State regards unregistered practice as a menace to public health, since the Legislature has not taken, nor even proposed, any effective steps to abolish it, or even to limit it except to an insignificant extent, nor does there appear to me much prospect of any such restrictive legislation being placed on the Statute Book. If in the future it should be, it will then be time enough to reconsider the matter, in the meantime this council can hardly anticipate an Act of the Legislature.

Another important matter of principle which you will be invited to discuss is that of the recognition, for the purposes of registration under the Assam Medical Act, of medical degrees conferred by foreign universities. The Act provides, under section 18, that the Provincial Government, acting either independently or on the report of this council, may include in the schedule any medical diploma or title of a foreign university or medical corporation, which, in their opinion, is a sufficient guarantee that the person possessing it has sufficient knowledge and skill requisite for the efficient practice of medicine, surgery and midwifery. This section has not, so far as I am aware, ever been applied to degrees of foreign universities, and it will be for you to decide whether or not you consider that the particular applicant's medical degree is at least equivalent to the minimum qualifications recognized by the Act, and if so, whether or not the circumstances which,

as in this case, have led to the forcible expatriation of Jewish doctors formerly practising in certain parts of Central Europe, justify, on the grounds of international humanity, and in the absence of any reciprocal relations, the recognition, in special cases, of doctors who have lost their means of livelihood in their own country, and you will be asked to make recommendations to Government accordingly.

On a motion from the Chair, it was unanimously resolved "that this Council, after further deliberation, is of opinion that the association of registered with unregistered practitioners, both being employees of the same industrial concern, as on certain tea gardens in Assam, though undesirable, cannot be considered as "infamous conduct in a professional respect", within the meaning of Section 5(a) (ii) of the Assam Medical Act of 1916".

CINCHONA PROSPECTS IN INDIA

'INDIA contains enough first class land for an early resumption of cinchona growing', observes Mr. A. Wilson, Deputy Director of Agriculture, Cinchona, Madras, in an Imperial Council of Agricultural Research Bulletin.

India produces only 70,000 lb. of quinine but consumes 210,000 lb. and, therefore, imports 140,000 lb., mainly from Java. India's real need of quinine, however, has been estimated at 600,000 lb. hence the importance of extending cinchona cultivation in India.

The Royal Commission on Agriculture emphasized the importance of cheap quinine. On the advice of the Indian Research Fund Association, the Central Advisory Board of Health in July 1937, resolved that an officer experienced in cinchona cultivation should investigate areas suitable for its cultivation at the cost of production. The Imperial Council of Agricultural Research arranged and financed this investigation.

COMMERCIAL POTENTIALITIES

The two most important species utilized by cinchona plantations in India are known as *Cinchona ledgeriana* which predominates in Bengal, and *Cinchona succirubra*, the red bark variety. The latter presents certain advantages for certain soils and elevations but the former, the principal variety in Bengal, has much greater commercial potentialities, on account of its high content of the invaluable alkaloid. Mr. Wilson recommends that further attention should be concentrated on this variety.

In cinchona growing, elevation, aspect and soil are of primary importance. Most important is the definite finding that cinchona is a delicate crop requiring good plantation management comparable with orchard cultivation. If cinchona is to succeed, there must be properly organized nurseries putting out healthy seedlings which will grow into vigorous trees. Given a proper organization of nurseries and a steady offtake of bark at guaranteed prices, the cinchona plant would not be unsuitable for smaller growers but any idea that it can profitably be grown as a forest tree may be dismissed.

The investigation included a survey of likely areas and a study of cinchona soils, including potential cinchona soils, formed an important part of the investigation. The bulletin states in what areas efforts to extend cinchona cultivation are most likely to be successful.

COST OF PRODUCTION

The report contains estimates of the cost of production of cinchona bark and the prices of medicinal preparations from it—of converting the bark into quinine and into the mixed alkaloids, a cheaper preparation, commonly called totaquina. Details are given of a seven-year planting scheme which would bring Indian production up to the present level of consumption. While no great reduction in the cost of quinine is foreshadowed, the figures show that, in suitable areas, quinine can be produced in India at world market prices.

Mr. Wilson emphasizes the need for research and experiments in a number of directions. Any area selected for development should be first tested by small properly organized experiments to determine the yields of bark, the difficulties to be overcome and the cost of production. The need for further research is also emphasized. Amongst the stock of cinchona plants at present existing in the country there are undoubtedly strains of superior plantation performance containing a much higher percentage of quinine than the commercial mixed crop. By suitable methods these could be isolated and multiplied. Further experimental work is also required on the improvement of cultivation methods and in the reduction of the cost of extraction and distribution of quinine.

There are one hundred million sufferers from malaria in India calling for an annual supply of some 600,000 lb. of quinine. Immediately 38,000 acres of first class cinchona land is available, and this is distributed in Bengal, Assam, Orissa, Bhutan, Sikkim, Madras, Travancore, Cochin, Mysore and Coorg. Much of the hill land which is not yet fully explored shows promise and will require further investigation in the future.

MINERAL SPRINGS IN INDIA

Occurrence of two sulphurous springs in Riasi district, Kashmir, are reported by the Geological Survey of India.

The one, which is situated about a quarter of a mile above Khar along the Tawi river, discharges hot water only during winter. It precipitates a good deal of milk of sulphur.

The other spring is, of course, the well-known thermal spring at Tattapani. Its water is apparently possessed of certain therapeutic properties for curing skin diseases and gouty affections. This spring is visited by a large number of people from far and near. The water gives a strong sulphurous odour and maintains a constant high temperature of 70° to 80°C.

The name Tattapani is familiar in various parts of India—as in the Sutlej valley north of Simla, in the coalfield of this name on the northern border of Sirguja, in the Kopili valley in Assam, etc.—at places where thermal mineral springs occur. There are, however, numerous other localities, many well-known places of pilgrimage, where hot springs are among the chief attractions because the waters have been found efficacious in the treatment of disease.

CATALOGUE OF HOT SPRINGS

Several years ago the Geological Survey of India compiled a catalogue of the hot springs in this country, but in this connection we are in need of additional information both with regard to the radio-active and mineral character of the waters from a geological aspect and the medicinal properties of the water from a medical point of view.

Just before the Italian occupation of Abyssinia an officer of the Geological Survey of India made a special investigation of several hot springs in that country on behalf of the Emperor of Ethiopia who then contemplated establishing a health resort in his territory. The special apparatus for ascertaining the radio-active property of spring waters in the field employed in Abyssinia is now in the possession of the Geological Survey. This department has, besides, even more delicate laboratory apparatus for the same kind of work and at least three officers who are already familiar with this class of investigation.

It is understood that an exhaustive examination of the general springs of India is under consideration and it is hoped that the Geological Survey of India will shortly be able to arrange a programme. But the determination of the physical and chemical constitution of the mineral waters must be supplemented by an investigation of the cures which are said to have been effected by the various waters and for this purpose medical collaboration is necessary to complete the investigation to give the final report its greatest value.

Though mineral springs have till now attracted little public attention in India, spas and hydros in Europe which have grown up at numerous places where mineral springs occur and the therapeutic properties of the waters are beyond dispute are highly popular resorts with those who seek health and holiday.

THE CHOLERA DANGER IN INDIA: MELAS AND THE SPREAD OF CHOLERA

SINCE every large gathering of pilgrims appears to hold out a threat of the spread of cholera, the Central Advisory Board of Health at its meeting in Madras last January decided that the time had come to consider whether the authorities responsible for the health of the people should be armed with powers to enforce preventive inoculation. In order to investigate the question, the Board appointed a committee consisting of the Hon'ble Dr. T. S. S. Rajan, Minister in charge of the Public Health Department, Madras, the Hon'ble Dr. M. D. D. Gilder, Minister in charge of Health, Bombay, the Public Health Commissioner with the Government of India and the Directors of Public Health of the Punjab, Bengal and the United Provinces.

At Pandharpur, in Bombay Presidency, where an important festival attracting over a lakh and a half of pilgrims takes place at this time of the year, the Provincial Government has been able to carry out inoculations of the great majority of pilgrims in recent years. The committee appointed by the Central Advisory Board of Health will meet at Pandharpur on 26th June, in order to see for themselves the procedure adopted by the authorities there. The committee will reassemble in Poona on 28th June in order to consider its report.

The important part played in the spread of cholera by large gatherings of pilgrims at festival centres has long been recognized by public health authorities in this country. Provincial public health departments are now taking elaborate precautions in respect of such gatherings by special attention to the sanitation of the festival area, medical inspection of the pilgrims, arrangements for the segregation and treatment of persons suffering from infectious diseases and intensive propaganda for carrying out mass anti-cholera inoculation among intending pilgrims. However, the most efficient sanitation of the festival area will not suffice to ward off the danger of cholera outbreaks when large numbers of pilgrims may arrive from or pass through cholera-infected areas on their way to and from the place of festival.

The explosive outburst of cholera that followed the Hardwar festival in April 1938, and produced a large increase in the incidence of the disease in a number of provinces and states, brought prominently to public notice the necessity for the application of all available methods to ward off the danger. The value of inoculation with cholera vaccine in conferring protection against the disease is now generally recognized and it is true that, within recent years, the willingness of the people in this country to accept inoculation has undoubtedly grown. Education of the people through the propaganda carried out by provincial health authorities and voluntary organizations has been largely responsible for this result and educative efforts must no doubt continue in order to provide a background of public opinion in support of this measure.

THE BIRTH CONTROL RESEARCH COMMITTEE

THE number of people who visited and sought advice at the Birth Control Centre at 162A, Aram, Lady Jehangir Road, off Vincent Road, Dadar, Bombay 14, conducted by the Birth Control Research Committee of Vile Parle, during quarter ending 15th June, 1939, was 420, out of which 225 were males and 195 were females.

THE TINNEVELLY DISTRICT COUNCIL ASSOCIATION, PALAMCOTTAH

(TINNEVELLY BRANCH OF THE INDIAN MEDICAL
ASSOCIATION)

Monthly meeting

THE Tinnevelly District Medical Association held its monthly meeting on Saturday the 24th of June, 1939, at Papanasam, one of the most sacred places of the district, noted for natural scenery and most charming waterfalls.

Members numbering 40 gathered from all parts of the district.

The meeting began at 10 a.m. The secretary and treasurer read out the resignation letter from Lieut.-Colonel T. S. Shastri, I.M.S., the former president of the Association, which was accepted. Dr. R. V. Padmanabhan, M.B., B.S., proposed Lieut.-Colonel K. V. Ramana Rao, I.M.S., district medical officer, to be the president of the Association and seconded by Dr. L. Mahadevan, M.B., B.S., D.O.M.S. Lieut.-Colonel K. V. Ramana Rao, I.M.S., was unanimously elected as president of the Association.

The secretary and treasurer read out the minutes of the last meeting held at Srivaikuntam on Saturday the 27th of May, 1939.

BIOLOGICAL PRODUCTS STANDARDS. NATIONAL CENTRE FOR DISTRIBUTION. NEW ARRANGEMENTS AT BIOCHEMICAL STANDARDIZATION LABORATORY

THE BIOCHEMICAL STANDARDIZATION LABORATORY, All-India Institute of Hygiene and Public Health, Calcutta, has been constituted a 'national centre' for the distribution of standard preparations of biological products to those that ask for them. If laboratories intimate their requirements, the centre will import and supply the appropriate standards.

Standards have been established for many products by the Biological Standardization Committee of the League of Nations, and the actual 'standard preparation' of each kind is maintained and issued to research and manufacturing laboratories by specified institutes, such as the National Institute for Medical Research, Hampstead (under the Medical Research Council), and

the State Serum Institute, Copenhagen. For convenience of distribution of the 'standards' to those that require them, it has been found advisable to form 'national centres' in countries where biological products are manufactured. These centres receive duplicates of each standard at intervals and issue them to working laboratories for the control of their preparations.

Formerly, laboratories in India had to obtain their 'standards' from the institutes in Europe possessing each individual type, but, with the new arrangements now brought into force, it will be possible for them to get their requirements from the Biochemical Standardization Laboratory, Calcutta.

The following are the standards which will be available at the Laboratory:—

Insulin;
Pituitary (posterior lobe) standard powder;
Oestrus-producing hormones:
(i) Hydroxy-ketonic form;
(ii) Mono-benzoate of di-hydroxy form;
Male hormone (androsterone);
Corpus luteum hormone (progesterone);
Neoarsphenamine;
Sulphursphenamine;
Quabam or strophanthin;
British standard tincture of strophanthus;
Standard digitalis powder;
Adrenaline and scillaren standards.

In the manufacture of biochemical and pharmaceutical products, many of the finer qualities of which are produced in the country, India possesses a growing industry of great value. But the quality of the products has to be assessed by biological tests in relation to exact standards. The new arrangements now made at the Biochemical Standardization Laboratory are, therefore, likely to be of great assistance to this industry.

INDIAN MEDICAL SERVICE (CIVIL)

IN exercise of the powers conferred by sub-section (3) of section 244 of the Government of India Act, 1935, the Secretary of State for India has prescribed that the strength of the Indian Medical Service (Civil) shall be as given in the table below:—

TABLE

Statement showing the strength of the Indian Medical Service (Civil) under the new organization

Character of posts	Central Govt. E. H. and L. Department	External Affairs Department	Crown Representative	Madras	Bombay	Bengal	United Provinces	Punjab	Bihar	Central Provinces	Assam	N.-W. F. Province	Sind	Orissa	Total
(a) Duty posts reserved ..	30	11	7	15	12	14	14	10	9	5	7	4	2	2	142
(b) Leave reserve against (a) ..	8	3	2	4	3	4	4	3	2	2	2	1	1	1	40
(c) Other medical posts ..	..	..	..	7	5	6	4	4	3	..	..	3	2	..	38
(d) Posts temporarily reserved for officers in civil employment on 10th May, 1928.	..	..	..	6	3	2	2	7	2	1	4	..	..	..	27
(e) Posts temporarily reserved for officers in civil employment on 1st April, 1937.	5	..	..	10	7	12	13	12	9	5	..	3	..	..	76
TOTAL ..	43	14	9	42	30	38	37	36	25	16	13	11	5	4	323

Current Topics

Chronic Cholecystitis

By C. F. W. ILLINGWORTH, M.D., F.R.C.S. (Edin.)
(From the *Medical Press and Circular*, Vol. CCI,
5th February, 1939, p. 162)

CHRONIC disease of the gall-bladder occurs in more than 10 per cent of adults over the age of 40 years; it is thus by far the commonest organic cause of long-standing indigestion, and exceedingly important as a disease responsible for much chronic ill health.

In its early stages, cholecystitis is essentially a disease amenable to medical measures; later, especially if complicated by the formation of gall stones, it can only be treated satisfactorily by operation. It becomes evident, therefore, that the practitioner, upon whom rests the ultimate responsibility for treatment, must not only be acquainted with the symptoms of the early, curable stage and with those accessory measures which will enable him to arrive at a diagnosis, but he must also be able to picture to himself the stage to which the disease has progressed and thus to decide between medical and surgical measures. To do this, he must have a clear understanding of the nature and course of the pathological process in which the gall-bladder is involved.

Cholecystitis may originate independently of gall stones, or it may precede or follow the development of gall stones. Thus, on the one hand, a simple inflammation of the gall-bladder may remain non-calculous, or it may predispose to the formation of the common, multiple, 'septic' stones; whilst, on the other hand, a pure cholesterol gall stone may arise in an aseptic manner and lie in a perfectly healthy gall-bladder, or it may, by its irritative effects, predispose to the later development of inflammatory changes in the gall-bladder wall.

In general, it may be said that in the majority of cases of cholecystitis without stones, the inflammatory process is of mild type—a catarrh of the gall-bladder. At this early stage the function of the gall-bladder, as demonstrated by cholecystography, is not greatly impaired. Experience shows that in this class of case medical treatment, if carried out strictly and maintained for a sufficient length of time, will always be beneficial and sometimes curative, whereas the end-results of surgery often leave much to be desired.

It is a very different story in the more severe types of cholecystitis, which are generally associated with gall stones. Now the pathological changes are more marked. The gall-bladder, which may be adherent to surrounding structures, is palpably thickened and fibrotic, whilst microscopic examination will show replacement of the tissues of the gall-bladder wall by granulation-tissue elements and inflammatory cells. If gall stones are present the mucous membrane of the gall-bladder may be ulcerated or scarred whilst if a stone has been impacted in the neck of the gall-bladder or the cystic duct the viscus will be distended with mucus, thick, fleshy and adherent.

In these more severe types of cholecystitis the function of the gall-bladder is markedly impaired—in fact, it is converted into an inflamed, fibrotic sac, a cause of chronic disability, a source of focal infection, and a potential seat of carcinoma.

DIAGNOSIS

Chronic gall-bladder disease is to be diagnosed from a number of other affections of the abdomen and thorax.

Simple dyspepsia is a common source of difficulty in early cases. The symptoms of uncomplicated cholecystitis are mainly dependent upon interference with the mechanism of the biliary outflow, for the inflammatory changes in the gall-bladder wall lead to atony of its musculature and interfere with its normal

functions of storing, concentrating and periodically discharging the bile. Thus the digestion of fats is impaired. In the absence of gall stones or gross infection, the clinical features of cholecystitis are merely those of fatty dyspepsia, with flatulence, epigastric discomfort after meals, abdominal distension and sometimes heartburn. Often there is intolerance for fats, and the patient will have noticed that she can gain relief by avoiding such foods as potatoes, butter, eggs or fried foods. Fortunately at this early stage an immediate diagnosis is not essential for in any case the treatment is by medical measures. Only later may the question of operation be raised.

Peptic ulcer (gastric or duodenal) is readily recognized in most cases by the regularity of the pain, its precise relation to the taking of food, the relief obtained by a glass of milk or an alkaline powder, and a history of long periods completely free from indigestion. But when a stout woman comes to us complaining of similar symptoms we are apt to remember the aphorism, 'fair, fat and forty', and forget that even a patient of such a biliary diathesis may yet suffer from ulcer—especially as in such cases the characteristic deep boring pain of the ulcer is apt to be obscured by additional symptoms of flatulent type, whilst frequent recourse to the tea-cup and biscuit may tend to hide the periodicity of the pain. It was Sir David Wilkie who first drew attention to this difficulty in the diagnosis between ulcer and cholecystitis, and I have several times had occasion to confirm the truth of his observation.

Chronic appendicitis may cause some difficulty in diagnosis if the appendix is situated in the high retro-cæcal position, when the point of maximum pain and tenderness is considerably higher than usual. In doubtful cases much help is to be obtained from x-ray examination after administration of barium, for under the screen it is possible to visualize the cæcum, to roll it under the fingers, and thus to determine if the site of tenderness corresponds to the position of the appendix.

Kidney lesions in stout women may be an occasional source of difficulty if the site and radiation of the pain are not characteristic. This is just the type of case in which the value of modern aids to diagnosis is so manifest, for by pyelography and cholecystography, supplemented by a general clinical and urological examination, an exact diagnosis should always be possible.

Cancer of the colon must not be forgotten as an occasional source of difficulty. Sometimes the flatulence, the epigastric distension, the nausea and occasional vomiting produced by a deep-seated growth at the hepatic flexure may closely simulate the features of cholecystitis, whilst there may be no symptoms referable to the distal bowel.

Cardiac disease may cause misleading symptoms which may be mistaken for those of cholecystitis. In congestive heart failure there may be pain in the liver region, due to distension of the liver capsule, whilst there may in addition be a tinge of jaundice. Similar symptoms are also found in minor degrees of coronary thrombosis. Generally there is a history of precordial pain and dyspnoea, whilst any tenderness in the upper abdomen is generalized over the whole liver margin, rather than localized to the gall-bladder point. In doubtful cases, an electrocardiograph may give valuable help.

X-RAY INVESTIGATION

The method of cholecystography, introduced in 1924 by Evarts Graham of St. Louis, is now accepted as a routine procedure in the diagnosis of biliary disease.

In order to obtain reliable results every detail of the method must be given careful attention, and the x-ray apparatus and technique must be such as to give a radiograph of first quality. As a routine, a 'straight plate' should first be taken, for with modern apparatus it is possible to visualize directly a not inconsiderable number of gall stones. Thereafter the opaque dye is given, usually in the evening. It is given by mouth, and in order to avoid the risk of its causing nausea

and vomiting, as well as to facilitate absorption, I prefer to give it in divided doses with an interval of two hours, or so. From this time until the x-ray examination, which is usually done the following morning, food must be withheld completely, and fluids should be reduced as far as possible in order to minimize air-swallowing, which will tend to obscure the x-ray picture.

The interpretation of radiographs of the biliary tract requires experience and a good deal of care. A dense, well-defined cholecystogram indicates that the liver is capable of secreting the dye, that the bile ducts are patent, and that the concentrating function of the gall-bladder is not impaired. Although it cannot be assumed to exclude a mild degree of cholecystitis, such a picture is of great value as evidence that the gall-bladder is free from gross disease; whilst further confirmation is obtained if, after a fatty meal, the gall-bladder shadow is reduced in size as a result of the discharge of its contents into the duodenum.

Failure to visualize the gall-bladder is generally an indication of biliary disease—gall stones obstructing the entrance of dye into the gall-bladder or such severe inflammatory change in the gall-bladder wall as to interfere greatly with its concentrating function. In interpreting such a finding, care must be taken that the dye has been properly administered, and has not been vomited. Moreover, the x-ray film must be examined to see that the dye does not remain unabsorbed in the intestinal tract, where it will be visible as scattered opacities in the ileo-caecal region. Care must also be taken that no food has been given before the x-ray examination has been made, for this might cause premature emptying of the gall-bladder. Subject, however, to these conditions being observed, I regard absence of the gall-bladder shadow as of great significance in evidence of biliary disease.

The greatest value of cholecystography is seen in cases in which the gall-bladder contains pure cholesterol stones, which, invisible in a simple x-ray film, can be demonstrated as negative shadows when the gall-bladder has filled with the opaque dye. In such cases, the diagnosis can be affirmed with complete confidence.

TREATMENT OF CHOLECYSTITIS

Consideration of the pathology of cholecystitis makes it evident that the line of treatment must vary according to the stage to which the disease has progressed. In the early stages, when the disease takes the form of a mild catarrh of the gall-bladder, much may be done by a thorough course of medical treatment—dietetic, physiotherapeutic, choleric as well as purely medicinal.

A low-fat, low-cholesterol diet is generally advised, and although such a diet *per se* cannot influence the inflammatory process, it relieves the flatulent dyspepsia and also has a valuable effect in bringing down the weight. Regular exercises are also helpful from this point of view, and it is often quite remarkable how the symptoms of early cholecystitis will clear up in response to simple weight reduction. Even in the later stages, a slimming diet helps to mitigate the symptoms, whilst it is of very special value when operation is being considered. In obese subjects, the risks incidental to operation can be very greatly reduced by a preliminary course of gentle exercise and rigorous dieting.

The type of operation to be carried out varies according to the precise condition of the gall-bladder, but as a routine I strongly favour the performance of cholecystectomy, a clean operation which carries a low mortality and precludes all possibility of recurrent stone formation. Only in 'poor-risk' subjects in whom the gall-bladder is shrunken and adherent, in acute cholecystitis, and in cases complicated by deep jaundice, do I prefer the minor procedure of cholecystostomy.

As a routine, in operating on the upper abdomen, the use of chloroform and ether should be avoided, and especially so in biliary operations on stout women, who are so apt to be a little 'chesty' for a few days after operation. Gas and oxygen or cyclopropane anaesthesia generally suffices to give sufficient relaxation,

supplemented if necessary by a few drops of ether, and in this way much post-operative trouble can be avoided. In bad-risk cases if the gall-bladder is not too deeply placed, the greater part of the operation can be performed under local and regional anaesthesia, supplemented by light gas and oxygen during the dissection at the cystic duct.

By such means as these, and by the utmost gentleness in operative manipulation, may the risk of operations upon the gall-bladder be diminished.

Neurology: Some Modern Problems

By W. RITCHIE RUSSELL, M.D., F.R.C.P. (Edin.),
M.A.C.P. (Lond.)

(From *Edinburgh Medical Journal*, New Series,
Vol. XLVI, April 1939, p. 221)

THE study of diseases of the nervous system has for long been one of the most precise of clinical sciences. Neurologists have laid special stress on the accurate demonstration of clinical signs and their correct interpretation. The localization of function by means of the clinical study of the effects of lesions of brain and spinal cord has played a leading part in the progress of neurology. The correlation of clinical and pathological material has made it possible to distinguish a great number of diseases and syndromes with accuracy. The result of these developments was that in nine out of every ten cases of organic nervous disease a diagnosis could be made with accuracy. This diagnosis indicated the anatomical site of lesion, the pathological changes in the diseased tissue, and the probable prognosis. Unfortunately, however, the cause of the disease was in most instances unknown, and treatment was often of little avail.

Times are, however, changing: the causative factors concerned in the development of several nervous diseases have been discovered so that the treatment of many cases of nervous disease has become more hopeful. New discoveries, however, raise new problems, and I wish to give you a brief personal impression of some of these difficulties.

Deficiency diseases.—The recent discovery that certain diseases of the nervous system are deficiency diseases constitutes a notable advance. Subacute combined degeneration of the spinal cord is now a most important example of a deficiency disease. Adequate liver therapy has completely altered the outlook in this condition, for the progress of this disease can now be permanently arrested, and in many cases a striking improvement in the clinical condition follows treatment. It is, of course, essential that treatment should be begun while the disease is in its early stages, for serious degenerative changes in the spinal cord are irreversible.

In subacute combined degeneration the changes may be chiefly in the spinal cord, or they may be mainly and sometimes almost exclusively in the peripheral nerves. Whether the same deficiency factor is responsible for both the cord and peripheral nerve change is not known. The pathological changes in the peripheral nerves are similar to those seen in beriberi; the administration of vitamin B₁ by itself will not, however, benefit cases of subacute combined degeneration: intensive liver therapy is essential. From my observations on some cases of this disease, however, I have reason to think that vitamin-B₁₂ therapy is also of value in combined degeneration, especially when there is evidence of peripheral nerve involvement. An interesting feature of the pathological changes in combined degeneration is the absence of gliosis in the degenerated tracts of the spinal cord. If liver treatment has been given, however, gliosis does occur (Biggart). If we knew why gliosis does not occur in the degenerating tracts, it is at least conceivable that some therapeutic measure could be devised which would inhibit the excessive gliosis within the brain and spinal cord which aggravates many nervous diseases.

Certain forms of polyneuritis, including those due to alcohol and the toxæmias of pregnancy, are probably

pure deficiency diseases and are due to a lack of vitamin B₁₂ in the tissues. They can usually be cured by the administration of vitamin B₁₂. When the nerves are only slightly degenerated I have repeatedly observed that the improvement following a single injection of the vitamin is quite dramatic and may be demonstrable within twenty-four hours of it being given; when, however, severe degeneration has occurred, recovery can only be slow. There are many cases of polyneuritis in which the cause of the condition is unknown, but which nevertheless improve with vitamin-B₁₂ treatment. These cases show no anemia, but often have achlorhydria and a smooth atrophic tongue similar to that seen in pernicious anemia. The vitamin-B₁₂ deficiency is usually due to a faulty diet, but in some cases alimentary disturbances may interfere with the absorption of essential food factors. Improved methods of estimating the amount of vitamin B₁₂ in the blood, which have recently been devised, may make it possible in the near future to demonstrate conclusively which diseases are associated with this form of deficiency. It may be possible to establish the degree of vitamin deficiency in the individual case, and also to study accurately the effect of alimentary disorders on vitamin-B₁₂ absorption.

The interesting condition known as acute infective polyneuritis produces severe and widespread paralysis, but this disease is not due to vitamin-B₁₂ deficiency, for I have treated such a case with daily injection of 2 mg. of vitamin B₁₂ without preventing the condition from becoming steadily worse until complete paralysis of all four limbs occurred. Complete recovery did ultimately occur, but no credit for this result could be given to the treatment with vitamin B₁₂. Acute infective polyneuritis is probably the same disease as Landry's paralysis; the spreading paralysis which occurs may progress slowly or quickly, but it usually causes very severe and widespread paralysis of the muscles of the body. Fortunately the respiratory muscles often escape involvement and slow recovery occurs. Recovery is remarkably complete in those cases which survive the acute stage.

There are other forms of polyneuritis such as the post-diphtheritic type, which are, as far as is known, not deficiency diseases. It is therefore evident that the peripheral nerves undergo similar degenerative changes in several diseases in which there is no common etiological factor. Our ignorance regarding the normal metabolism of peripheral nerves handicaps attempts to investigate these conditions.

Neuro-syphilis.—Tobes dorsalis and dementia paralytica are syphilitic diseases, and appropriate anti-syphilitic therapy has a striking effect in checking their progress, though the addition of malarial treatment is necessary in cases of general paralysis of the insane. It is, however, very doubtful whether *Spirochaeta pallida* is the only factor in the causation of these diseases. There has been a striking reduction in the number of cases of neuro-syphilis during the past thirty years, and this cannot be attributed only to the more thorough treatment of the primary disease. It is becoming probable that the central nervous tissues must be in an unhealthy state before the spirochæte is able to cause these diseases. The nature of this state of impaired health is unknown, though one cannot but wonder whether some deficiency food factor may be concerned.

Disseminated sclerosis.—Disseminated sclerosis presents one of the most perplexing problems in neurology: this disease is, of course, a clearly defined clinical entity which is like no other disease. The clinical course which the disease runs is a most perplexing feature of many cases. All neurologists are familiar with patients who recover from the early manifestations of the disease, and who remain apparently in perfect health for many years; remissions lasting for twenty years or more may occur. If, the disease can spontaneously remain dormant for so long surely there must be some simple remedy. It is difficult to imagine how an infection can be responsible for a disease which behaves in this way. There are also some serious drawbacks to the conception that disseminated sclerosis

is a deficiency disease. The disease occurs in young healthy people who often appear to be living under ideal conditions as regards both environment and diet. It is uncommon in the later decades and in early childhood when deficiency diseases are most likely to develop. It is seldom met with in countries where deficiency diseases are common. It does not occur in pyloric stenosis or gastric carcinoma. Finally, I may add that I have observed striking improvement to occur in patients suffering from disseminated sclerosis who were deliberately fed on a diet low in all vitamins.

If, therefore, disseminated sclerosis is neither an infection nor a deficiency disease, what else can it be? Here again I can only speculate, but I think that it is important to bear in mind the possibility that it may be a manifestation of a metabolite disturbance affecting the whole body. Study of the other tissues and activities of the body might provide a promising line for investigation. In my experience, for example, the patient with disseminated sclerosis has little fatty tissue, and he remains thin even when he becomes unable to take exercise, in contrast to the tendency to put on weight when paralysis results from many other nervous diseases. Is it conceivable that a disturbance of fat metabolism could be responsible for the demyelination which is the striking feature of the plaque in disseminated sclerosis? There is no evidence to support such a suggestion, and yet it might be profitable to look not at the nervous system, but at the other tissues in studying this confusing problem.

CHEMICAL TRANSMISSION OF NERVE IMPULSE

The discovery that nervous impulses conveyed by the vagus nerve to the heart are transmitted by the liberation of minute quantity of acetylcholine has led to some very important advances, one of the most striking of which is that Dale and his collaborators have shown that acetylcholine is also responsible for the transmission of nerve impulse to voluntary muscle. This is obviously a most dramatic and brilliant discovery, the consequences of which are now being slowly unfolded. It may be noted, in the first place, that if a chemical substance is responsible for transmission at the myoneural junction of voluntary muscles it must be possible for that substance to be formed or liberated with great rapidity; and, further, it must be capable of rapid destruction or displacement to allow of the normal quick relaxation of voluntary muscle. The chemical substance must also be available in considerable quantity so that it can stimulate prolonged or repeated muscular activity. It is not yet known how acetylcholine is formed in the tissues, but Stedman has shown that animal tissues contain a specific enzyme, choline esterase, which rapidly destroys it.

The clinical application of Dale's work is equally remarkable. Walker found that physostigmine (and especially one of its analogues, prostigmin) temporarily relieves the muscular weakness in cases of myasthenia gravis. As physostigmine inhibits the action of choline esterase, it seems probable that its administration in this disease either conserves the supply of acetylcholine at the nerve endings or prevents its excessive destruction. It seems possible, therefore, that myasthenia gravis may be associated with a lack of acetylcholine at the myoneural junction or with an excessive activity of choline esterase. Dr. Stedman and I studied the choline-esterase content of the blood in several cases. In two of these the blood estimation was made first while muscular weakness was marked, and was repeated some months later after marked clinical improvement had occurred spontaneously. In both these cases the clinical improvement corresponded with a drop in the amount of choline esterase in the blood.

These observations exclude the possibility that in myasthenia gravis an excess of choline esterase is responsible for the rapid muscular exhaustion which characterizes this disease. It seems more likely, therefore, that this muscular condition is associated with a lack of acetylcholine at the myoneural junction.

Walker's discovery of the effect of physostigmine on cases of myasthenia gravis has provided strong confirmation of Dale's demonstration that acetylcholine is

concerned with the transmission of nerve impulses to voluntary muscle. Further confirmation has been provided by the observation by Fraser, McGeorge and Murphy that the esters of acetylcholine also lessen the muscular weakness in myasthenia gravis. Potassium salts (10 grammes of potassium chloride) taken by the mouth also relieve this weakness (Laurent and Walther) and it is known that potassium salts stimulate the liberation of acetylcholine.

It occurred to Stedman and me that the muscular condition known as myotonia might also be associated with a disturbance of acetylcholine liberation. The myotonic muscle contracts powerfully, but relaxes slowly. With repeated contractions of the muscle, however, relaxation becomes progressively easier, and soon becomes normal. Excessive liberation of acetylcholine might account for such a state of affairs, and our investigations supported this conception, for we found that cases of myotonia react to drugs in a way which is the opposite of that seen in myasthenia gravis. We were able to show, for example, that the administration of prostigmin or potassium salts aggravates myotonia so greatly that the patient may temporarily become helpless with muscular rigidity. There are other interesting comparisons between myotonia and myasthenia. Wolff reported that quinine relieves myotonia: we have confirmed this and find also that it has the opposite (a bad) effect in myasthenia gravis. One of our patients with myotonia congenita noticed that when he first awakens in the morning the muscles are quite normal, and Dr. Laurent has drawn my attention to the fact that the patients with myasthenia gravis are sometimes very weak when they first awaken. Finally, the most striking contrast between the two diseases is observed following exercise, for the condition of the myasthenic becomes much worse, while the myotonic patient improves greatly. It seems likely, therefore, that while in myasthenia gravis there is some failure in the liberation of acetylcholine, in myotonia there is an excessive liberation of this substance.

The effect of sleep on these muscular disorders brings to mind the curious condition known as sleep paralysis in which the patient on waking finds, much to his alarm, that he is completely paralysed for a few minutes. This is probably an aggravation of a normal state, for muscle tone is diminished during sleep, and many healthy people have noticed that on waking rapidly from deep sleep, muscular power is impaired for a few minutes. It is interesting to note in this connection that in cases of familial periodic paralysis, the attacks of paralysis are usually noticed on waking in the morning. One patient who suffers from a form of periodic paralysis told me that if, after waking in the morning, he went to sleep again even for a short time, he might on waking a second time find himself completely paralysed, and the paralysis would continue for two or three days. Aitken, Allott, Castleden, and Walker have shown that these attacks of paralysis are associated with a sharp drop in the amount of potassium in the blood serum: they also found that an attack of paralysis can be quickly relieved by giving a solution of potassium chloride which raises the potassium content of the serum. These workers also found that the administration of glucose or insulin brings on an attack of paralysis in those who are liable to attacks. A reduction in the amount of potassium in the blood serum normally follows the administration of glucose or insulin, but this effect on potassium is more marked in cases of periodic paralysis than in normal subjects. During an attack of paralysis in this disease the affected muscle does not contract in response to electrical stimulation of the peripheral nerves: the disturbance which causes the paralysis must, therefore, be in the trunk of the nerve, the myoneural junction, or the muscle itself. There are, therefore, some similarities between myasthenia gravis and periodic paralysis: in both the site of the disturbance must be in or near the myoneural junction, while both conditions are benefited by the administration of potassium. The two diseases are, however, very unlike in most respects, and one important difference is that prostigmin, which benefits myasthenia, has no good effect in cases of

periodic paralysis. It seems unlikely, therefore, that periodic paralysis is caused by a disorder of the chemical transmission of nerve impulses: it is more likely that that abnormality affects the muscle fibres directly. The association of the attacks of paralysis with sleep is striking and, as I have already mentioned, sleep may have a definite effect on both myasthenia and myotonia. In attempting to throw light on the nature of these diseases, therefore, we are anxious to learn more regarding the bodily changes occurring during sleep. During sleep there is loss of muscle tone, and this fact when considered along with the effect of sleep on some cases of myotonia and myasthenia to which I have already referred, suggests that during sleep there is some alteration or inhibition of the chemical transmitter of nerve impulses.

In considering the effect of sleep on certain diseases of the nervous system, it is necessary to refer to these remarkable conditions, cataplexy and narcolepsy. These two conditions are closely related to each other for they often occur in the same patient. Cataplectic attacks cause no impairment of consciousness but sudden atonic paralysis which lasts usually for less than a minute. Emotion, particularly laughter, is the usual precipitating cause. One patient I saw recently was much inconvenienced by cataplectic attacks. A slightly amusing remark heard while descending an escalator made him so weak that he was unable to step off the moving platform. A good shot at golf would make him drop paralysed to the ground; even a successful move at the game of draughts had a similar effect. The victim of narcolepsy, on the other hand, falls into a deep sleep on several occasions every day. Ephedrine has a striking effect in relieving many cases of both narcolepsy and cataplexy. It is interesting to note that ephedrine also benefits certain cases of myasthenia gravis.

If one compares cataplexy, familial periodic paralysis, and myasthenia gravis, certain similarities emerge: all these conditions cause muscular weakness; no definite pathological changes are known in connection with these diseases; all are affected in some way by sleep or are related to a disturbance of sleep. All these conditions seem to be an exaggeration of a normal reaction; the muscular helplessness which normally accompanies violent laughter resembles cataplexy: the paralytic attacks in familial periodic paralysis always follow sleep, while deep sleep in the healthy person may be followed by a short period of muscular weakness (sleep paralysis). Finally, it is noteworthy that, while in myasthenia gravis the muscles become fatigued rapidly, muscle fatigue is a normal effect of exercise. These diseases seem, therefore, to consist of an exaggeration of normal bodily reactions. Further, they all affect the motor system, all have features in common, and yet are unlike in many respects. The disturbances of function which are associated with these diseases occur at different levels of the motor system. In myasthenia gravis the fault is at the myoneural function, in cataplexy the effect is produced somewhere in the brain, while in periodic paralysis it is probably in the muscles themselves. In attempting to unravel this complicated problem, the further investigation of the effects of sleep on the body in general and the nervous system in particular might well prove to be helpful.

It has gradually become probable that the transmission of all nervous impulses from neurone to neurone, and from neurone to organ or tissue, is dependent on the liberation of a chemical substance at these nerve junctions and endings. Research work is now proceeding in an attempt to determine the chemical concerned with nerve transmission in the brain and spinal cord. There is some evidence to suggest that acetylcholine is, to some extent, concerned. Stedman has demonstrated the presence of acetylcholine in the ox's brain while Henderson and Wilson have demonstrated that the injection of acetylcholine into the cerebral ventricles has a direct effect on the brain.

These investigations may prove to be of very great value for if we knew the chemicals concerned, say, in stimulating the motor system of the brain, and if we

know the way in which these chemicals are formed in the tissues, means might be devised for controlling cerebral and spinal motor activity to a degree that is at present impossible.

We are, as yet, entirely ignorant regarding the chemical concerned with sensory nerve transmission. The absence of sensory phenomena when acetylcholine is administered suggests that this chemical is not concerned with sensory nerve conduction. It is interesting to speculate on the possibility that disturbances of the chemistry of nerve conduction might be the cause of certain diseases of the brain and spinal cord. Take, for example, the system diseases in which certain nerve tracts undergo degeneration. Progressive muscular atrophy is a striking example of such a disease, for in it the motor pathways undergo progressive degeneration while the sensory pathways remain intact. It is conceivable that the chemical transmission in the motor system could become disturbed in such a way as to cause damage to the nerve-cells with which it is connected. It is interesting to note in this connection that the muscular twitchings which occur after the administration of prostigmin are indistinguishable from those which occur spontaneously in the muscles in cases of progressive muscular atrophy. Such ideas are very speculative, but speculations are sometimes valuable for they may suggest lines of investigation for the research worker. The conception of the chemical transmission of nerve impulse has obviously opened up entirely new lines of research into the physiology and pathology of the nervous system.

EPILEPSY

Finally, I should like to say a few words about epilepsy. In a recent paper on rhythm in epilepsy, Griffiths and Tylor Fox have drawn attention to a problem which has been much discussed, especially in recent years. It is a matter of common knowledge that the individual epileptic may have his fits at certain times only of the day or night. The fits may occur only during sleep, or while falling asleep, or after waking; or they may occur only during the day. A long interval rhythm in epileptics is seen in those cases which have a fit or a series of fits at regular intervals of, say, a fortnight, a month, or every two or three months. The focus of cerebral irritation in these cases seems to develop gradually an increasing disturbance which culminates in a violent discharge, and the ultimate fit seems to allow the brain to return to normal for a further interval. In this type of case, therefore, the occurrence of a fit seems to give temporary immunity to further fits. The fit itself, therefore, appears to relieve the conditions which have led to the convulsion occurring, and to correct temporarily the abnormality of the brain tissue which leads to a convulsion. The transmission of nerve impulses at the cerebral cortex is probably as much dependent on a chemical substance as is the transmission at the myoneural junction; abnormal activity at the cortex

must, therefore, cause or be caused by an excessive liberation of the chemical transmitter. If we attempt to correlate this conception with the suggestion that in certain cases the occurrence of a fit allows the cerebral cortex to return to a more normal state, one is tempted to suggest that an epileptic fit may be preceded by an abnormal accumulation of chemical transmitter, and that this is dispersed when the fit occurs. In this connection it is interesting to note that mental activity is known to lessen the liability to a fit occurring. I remember a patient who had 20 to 30 minor fits after waking up each morning; if after waking he at once proceeded to read some difficult Greek which required considerable concentration he was able to reduce the number of attacks to three or four each morning. Mental exercise, therefore, appears to make the physiological state of the epileptic's brain more normal. One is tempted to point out that in cases of myotonia muscular exercise makes the physiological state of the myotonic's muscles more normal. Can there, therefore, be anything analogous between myotonia and epilepsy? Can they both be associated with an excessive accumulation of chemical transmitter at the myoneural junction and cerebral cortex respectively? The possibility is at least worthy of investigation.

Recent investigations with the electroencephalograph such as those of Gibbs, Gibbs, and Lennox describe a different form of rhythmical disturbance in epilepsy. The electroencephalograph records minute changes of electrical potential in the brain through electrodes applied to the scalp. In many normal people rhythmical waves of change of potential occurring at the rate of about 10 per second can be demonstrated by this means. In cases of epilepsy, however, abnormal and irregular waves appear, especially when a fit is imminent. In one patient daily records were made by Gibbs, Gibbs, and Lennox for over six months and most of the *grand mal* seizures were correctly predicted by means of the changes in the electroencephalographic tracings found on the mornings of the days the fits occurred. These authors have studied the electroencephalograms of 400 epileptic patients, and they conclude that 'the pathological physiology of epilepsy is a paroxysmal cerebral dysrhythmia'. Their term 'pathological physiology' interests me, for I have been trying to suggest to you that diseases such as myasthenia gravis, familial periodic paralysis, and myotonia are due to disturbance of physiology without there being any histological abnormality. The study of these rare diseases which affect the motor system has already thrown light on the physiology of muscle and nerve. We can only hope that the study of epilepsy by these new methods of electroencephalography will throw light not only on the physiology of the brain, but will show us how to improve the treatment of the epileptic.

To conclude, I must apologise for giving you little information which will be of value to you in your practical work. I hope, however, that I have been able to demonstrate that recent developments in neurology are of no little interest and importance.

Reviews

THE DYSENTERIC DISORDERS: THE DIAGNOSIS AND TREATMENT OF DYSENTERY, SPRUE, COLITIS AND OTHER DIARRHOEAS IN GENERAL PRACTICE.—By Phillip Manson-Bahr, C.M.G., D.S.O., M.D., F.R.C.P. 1939. Cassell and Company, Limited, London (La Belle Sauvage, E.C.4). Pp. xiv plus 613, with 9 colour, and 14 black and white plates and 106 illustrations in the text. Price, 25s.

The literature on dysentery and allied diseases is poor. The monographs that have appeared during the last quarter of a century have been indifferent

productions and some have been definitely bad, so that one has had to rely on chapters in books and encyclopædias; in these, the writers have been cramped for space and have therefore not done full justice to their subjects. To produce a good book on this difficult subject takes courage, experience, and great powers of discrimination; hitherto those with the experience have lacked one or other of the necessary qualities, so that either they haven't written at all or have produced a mass of undigested information, whereas others with courage have lacked the necessary practical experience. No one could possibly question

the courage or the experience of the present writer, and this book has shown that his judgment is good and that his powers of discrimination are developed to a high degree.

The scope of this book is wider than his abbreviated title suggests, and it might well have been called the *Dysenteric and Diarrhoeal Disorders*. This wider scope is however indicated in the subsidiary title.

The note which indicates the practical key in which the whole book is written is struck at the very beginning, as the first chapter is on differential diagnosis and the enumeration of the procedures that should be undertaken in investigating a case, whereas the second is on methods of examination of the patient and includes a descriptions of sigmoidoscopy.

Then, for the time being, the author deserts the practical plane and the third chapter is one which would presumably be described by Henry Ford as 'bunk', but to the reviewer was one of the most interesting chapters in the book; it is, need it be stated, an historical one. In this and the next chapter, which is on geographical distribution, it is made very clear that the disease is not truly a tropical one, but a disease of sanitarially backward areas and of occasions when there is a break-down in the sanitary organization. The fifth chapter, on classification, concludes the introductory part of the book.

Bacillary dysentery, rightly, claims first attention; there are four chapters, which cover a hundred pages, on this subject, but the largest share of space falls to amebiasis, to which six chapters are devoted. This historically and pathologically more interesting disease has often usurped the claims of the more deadly bacillary disease to the attention of the physician, sometimes with disastrous results, but it is a subject with far more facets and the writer could scarcely have done it full justice in less space. Under the same main heading, protozoal dysenteries, there is a chapter on balantidiasis, giardiasis and the flagellate dysenteries; in this chapter are included sections on plasmodial and leishmanial dysenteries.

The next chapter is on the important helminthic dysenteries. There is an important chapter on cholera. Recent work is reported, but perhaps too much space is devoted to past and obsolete observations and one is conscious of a lack of personal experience on the part of the writer. Statistics are quoted from the Calcutta Medical Hospital (*sic*), a hospital which it is hard to identify. Roger's saline treatment is naturally given preference, but a number of 'specific' treatments are also discussed. The inexperienced reader will find it difficult to choose between these, and he receives no help from the author. Bacteriophage is dismissed a little too summarily and more space is given to the very limited work that has been done with serum. Reference is made to the essential oils, the introduction of which is, for some reason, attributed to Tomb, though they have been used as a stock mixture in the Army dispensaries in India since the time of the East India Company. The association of this name with this mixture is particularly unfortunate, as, in the reviewer's experience, it is deadly form of treatment when given alone.

The chapter on sprue and hill diarrhoea is perhaps one of the best in the book. Here the writer has given full acknowledgment to the work of his colleagues in London, though it is a subject in which he has had very considerable experience. This chapter is followed by one on idiopathic steatorrhoea and coeliac disease, non-tropical conditions but pathologically associated with sprue, and their inclusion here is very suitable.

Other important chapters are on mucous colitis and ulcerative colitis.

The whole book forms a most important contribution to a very difficult subject; it is a book that will have a wide appeal in any country, but we particularly recommend it to all medical workers in tropical countries.

THE BRITISH ENCYCLOPÆDIA OF MEDICAL PRACTICE: INCLUDING MEDICINE, SURGERY, OBSTETRICS, GYNÆCOLOGY AND OTHER SPECIAL SUBJECTS.—Under the General Editorship of Sir H. Rolleston, Bt., G.C.V.O., K.C.B., M.D., D.Sc., D.C.L., LL.D. Butterworth and Company, Limited, London. (To be completed in 12 volumes.) Sold in complete sets only. Cash price, Rs. 25 per volume. Also available on the instalment system at Rs. 10 per month. Price, Rs. 26-8 per volume. Only available from Messrs. Butterworth and Company (India), Limited, Calcutta. Volume XI. Illustrated. Pp. xxi plus 676 plus 54

This volume covers subjects from scarlet fever to testis, undescended. Chance appears to have made it a volume of skin diseases, as not only is there a large section of 120 pages headed 'skin diseases', but there is one almost equally long on syphilis, and minor chapters on seborrhoea, seborrhoeic dermatitis, and scleroderma, not to mention the exanthemas, smallpox and scarlet fever.

The section on skin diseases does not claim to be a comprehensive one and there are 23 cross references to other sections, a list which again does not claim to be complete. The subject is discussed under five headings, each contributed by a different writer—affections due to insects and acarines by Arthur Whitfield, occupational diseases by S. A. Henry and Sibyl C. Horner (H. M. Medical Inspectors of Factories), locally inoculated infections by L. Forman and E. H. Koerner (both of Guy's Hospital), tuberculosis by Arthur Burrows, and tumours by Sidney Thomson. The various conditions are well described and the section contains a large number of relevant illustrations, including two coloured plates. Other skin diseases are dealt with under their individual names throughout the encyclopædia, and were they collected together into one volume they would provide as complete and comprehensive a book on the subject as one could wish for.

The section on syphilis is by Colonel Harrison. It is a comprehensive study by a man who has made the subject of venereal disease his life work: again the section is well illustrated.

J. W. McNee (inevitably) and John McMichael have written the section on spleen diseases. It is a surprisingly short chapter for so important a subject, and, though it is excellent as far as it goes, the writers have perhaps chosen the safest course and have ignored tropical splenomegalies.

Tropical sprue is dealt with, appropriately, by Hamilton Fairley. The various theories for its aetiology are discussed, but he has not wasted much time on these as most of them are easily dismissed. He considers that the suggestion that the disease is due to 'extrinsic factor' deficiency can be negated, as patients of the class that one most frequently sees have lived on a good mixed diet, and he considers that the cases on which this theory was founded are not sprue but tropical macrocytic anaemia. The reviewer agrees with this point of view; it is possible to improve the blood picture of a sprue case by giving liver extract, but the disease can only be cured by combining this with dietary treatment. The reviewer does not, however, agree that the disease is 'very rare' amongst Indians.

Volume 11 is a good one and perhaps one of the best volume of this excellent 'system'.

RECENT ADVANCES IN MEDICINE: CLINICAL LABORATORY THERAPEUTIC.—By G. E. Beaumont, M.A., D.M. (Oxon.), F.R.C.P., D.P.H. (Lond.), and E. C. Dodds, M.V.O., D.Sc., Ph.D., M.D., F.R.C.P. Ninth Edition. 1939. J. and A. Churchill, Limited, London. Pp. xvi plus 431. Illustrated. Price, 15s.

The *Recent Advances Series* has become so firmly established in medical literature that it is hard to believe that the first volume was issued only 15 years ago. This volume was appropriately *Recent Advances*

in *Medicine*; the volume under review is the ninth edition of this book. The eighth edition was published three years ago; this is the longest gap in the history of the book. Much has happened in these three years and very extensive revision was necessary, and has been undertaken; many chapters have been completely rewritten and new ones have been added. There have been considerable changes in the type used; this has allowed a 10 per cent increase in the number of words on each page without any sacrifice in readability. The references have been rearranged so that the same number occupy about half the space they did in the last edition. The result is that there has been a slight reduction in the number of pages and a considerable increase in the matter presented—a notable achievement on the part of the publishers.

The authors are also to be congratulated on their judgment in selection of subjects for inclusion. The first chapter is a very concise account of the sulphanilamides and allied drugs including M. & B. 693; this of course is an entirely new chapter. The next is a chapter on vitamins which is a little disappointing; the table was in the last edition (and possibly in earlier editions too) and should be replaced. Vitamin B₁₂ is now known to contain at least three distinct fractions, but one would not gather this fact from the account given, and there seems to be some confusion between the rat dermatitis and the pellagra fractions; the term nicotinic acid is not used.

Chapter III on the kidneys has been modified and considerable changes have been made in the next chapter on the dietetic treatment of diabetes. In fact additions and modifications have been made in nearly every chapter.

The method of King, Haslewood and Delory for performing the van den Bergh test has been added. The authors say that normal persons show 0.2 mgm. to 1.7 mgm. per 100 c.cm. of plasma bilirubin by this method, but add that most normal results are below 0.8 mgm. Further down in the same page, they give the normal limits as 0.2 to 0.5 units. In any case the 'unit' is an arbitrarily-chosen unit of measurement, corresponding to 0.5 mgm. per 100 c.cm. of blood, which is best avoided, as its use only leads to confusion. It will be seen that the two normal ranges given not only do not coincide but barely overlap. No attempt is made to explain this discrepancy.

The method of estimating the sedimentation rate with a hæmatocrit tube which can then be centrifuged and a correction made for anemia is described.

Much has been done with sex hormones during the last few years, both in treatment and diagnosis, especially the diagnosis of pregnancy. A good account is given of these advances in chapter X.

In conclusion one can say that the authors and publishers have effected considerable improvements in an already excellent book.

EVANS' RECENT ADVANCES IN PHYSIOLOGY.—

Revised by W. H. Newton, M.D., M.Sc. (Manch.). Sixth Edition. 1939. J. and A. Churchill, Limited, London. Pp. xi plus 490, with 109 illustrations. Price, 15s.

In the title of this book there has been a slight departure from the usual practice, in that the name of the original author is incorporated. This is a nice compliment to one of our greatest living physiologists, and in this case there is the further excuse that he himself contributed a new chapter in the last edition and has revised it for this, but the practice is not quite in keeping with the spirit of the series. Such a book is a selection from the moving picture of physiology of representative 'stills', which need bear little relationship to those of an earlier selector.

There are in this edition four completely new chapters: Chapter I on the physiology of bone summarizes work done mostly during the last ten years on this subject, but has avoided as far as possible reference to the effects of dietary and the action of the parathyroid hormone as introducing too much that is uncertain; the physician may feel that this is providing apple tart without any apple in it, but

there is much important work summarized in the 45 pages of this chapter which will give the young physiologist plenty to think about. The next chapter is a short one and devoted entirely to a description of the Carrel-Lindbergh perfusion apparatus.

The new chapter on carbohydrate metabolism is a stimulating one. The author draws attention to the fallacy that an increase in the normal blood sugar must be due either to increased intake or decreased utilization. As he points out, hyperpyrexia may be due to either increased heat production or decreased loss, but it is much more frequently due to some other cause which raises the point at which the balance between these two different actions is achieved: it is the same with carbohydrate metabolism, and one could conceive a state of affairs where the blood-sugar level was raised to say 150 mgm. per 100 c.cm. of blood without disturbance in intake or utilization, though if it rose above 180 mgm., the renal threshold, a new factor would be introduced.

The last chapter, and the fourth new one, is on the cortical control of muscular movements. It includes reference to much recent experimental work with monkeys.

Physiology provides a wonderful field for the research worker; our knowledge on every aspect of the subject is so incomplete. The author of this book has in many instances stated the problem and then presented the facts, as a series of tag ends that are waiting for others to pick up and join together; in some cases he has loosely knotted these ends, but in others he has not even done this.

It is a most interesting and stimulating book which we can thoroughly recommend to the young physiologist, and all physiologists should be young at heart.

RECENT ADVANCES IN OBSTETRICS AND GYNÆCOLOGY.—By A. W. Bourne, M.A., M.B., B.Ch. (Camb.), F.R.C.S. (Eng.), F.R.C.O.G., and L. H. Williams, M.D., M.S. (Lond.), F.R.C.S. (Eng.), F.R.C.O.G. Fourth Edition. 1939. J. and A. Churchill, Limited, London. Pp. x plus 366, with 98 illustrations. Price, 15s.

Those readers who are familiar with the earlier editions of this book were looking forward to a fresh edition, in view of the rapid advance in this branch of medicine. They will be grateful to the authors for bringing out this book where a good deal of interesting and useful information has been presented in a short and precise form. To each chapter has been added an excellent list of important references about the subject-matter dealt with. This should prove of great use to advanced students, practitioners and consultants in this specialty.

It is very difficult to single out any particular chapter or chapters for special appreciation. All of them have been interestingly written.

In the obstetrics part we single out the chapter on puerperal sepsis for special praise. We are of the opinion that we have not come across such a complete and masterly summary of the latest investigations of this complication of pregnancy in any recent publication on this subject. After going through this chapter one feels that one has got all the latest information that one may need when called upon to treat a case of puerperal sepsis.

The last edition of this book contained two chapters on maternal mortality and fetal death. These two chapters have been omitted in the present edition. Perhaps the authors did not want to add to the pages of the book.

There are several well-written chapters in the gynæcological part of this book. There is a detailed description and discussion of the various methods adopted in treating uterine cancer. The illustrations of the different radium applicators used in the big clinics will be particularly appreciated by practitioners in distant parts of the world who may not have the opportunity of direct knowledge from such clinics.

The chapter on sex hormones has been very ably written. The authors should be congratulated for the clever way in which they have described the various complicated experimental facts and clinical observations in connection with the discussion of the action and use of the hormones.

Mr. Wilfred Shaw's masterly description and classification of ovarian tumours has been included as a chapter in this section. This being one of the latest and important contributions to gynaecological pathology: the authors have been well advised to include it in their work.

The binding and printing of the book was good in the last edition and so it is in the present. More illustrations have been added; and these have served their purpose well.

M. S.

(a) **RECENT ADVANCES IN HÆMATOLOGY.**—By A. Piney, M.D., Ch.B. (Birm.), M.R.C.P. (Lond.). Fourth Edition. 1939. J. and A. Churchill, Limited, London. Pp. viii plus 312, with 8 coloured plates and 34 text-figures. Price, 15s.

(b) **PRINCIPLES OF HÆMATOLOGY. WITH 100 ILLUSTRATIVE CASES AND 155 ILLUSTRATIONS INCLUDING 168 ORIGINAL PHOTO-MICROGRAPHS AND 95 ORIGINAL CHARTS AND DRAWINGS.**—By R. L. Haden, M.A., M.D. 1939. Henry Kimpton, London. Pp. 348. Price, 21s.

(a) THE authors in this excellent series give different interpretations to the meaning of the words 'recent advances', and it is obvious that the publishers make no attempt to influence their authors; this is probably a wise course.

Fortunately, none of these authors has provided a book of 'stop press' annotations on his subject, but the majority have given résumés of the old—but still accepted—teaching in order to provide stepping-stones for the newer knowledge that they present. The author of this book has gone further: he has written what might be described as a 'primer' on the subject of hæmatology, in which he has certainly incorporated some of our new knowledge.

It is a book designed for the student; he will find it easy to understand and the author takes few risks in assuming prior knowledge on the part of the reader, so that the practitioner who has forgotten his physiology and histology can read it without embarrassment. Further, the book is well illustrated; the numerous coloured plates should help anyone to put a name to the cells he sees in the peripheral blood smear (or in the sternal puncture fluid, should he be a little more advanced in his outlook than the author), but whether it will be the name that other hæmatologists apply to that cell is a different matter; hæmatological nomenclature is still in a chaotic state.

There is a very useful plate showing the appearance of the different cells in a histological section of bone marrow which is so very different from that of the same cells in a bone marrow smear; if the illustration has a defect, it is that it is too diagrammatic.

The author has adopted a very conservative attitude; he has remained silent on the recent classifications of the anæmias, there is little said on the subject of the size of red cells and less about their volume, reticulocytes are mentioned but there is little about the importance of reticulocyte crises in estimating the effects of treatment, and the author doesn't seem to have heard of sternal puncture. There is practically no reference to tropical macrocytic anæmia and we did not notice any to the work of Wills. On the other hand some rare and interesting blood diseases are described in detail.

It is a book that we can recommend to the practitioner who, finding himself quickly out of his depth in more advanced books on hæmatology, has given up the uneven struggle.

(b) This second book is the complete antithesis of the first. Hæmatology is reduced to mathematical formula; you take the blood, put it into a machine, read the answer, apply a table or graph, and you have the correct diagnosis, about which nobody can argue. Science displaces art.

The author has described modern hæmatological methods in such a way that no one could fail to understand what he is trying to convey. There are diagrams on almost every page, and, if these are not always quite self-explanatory, by the time the student has worked out their meaning, he will certainly have acquired a more complete grasp of the subject, than if he had simply read it up in the text. There are however other figures that are a little too 'popular' in their conception and do not bear critical examination.

[In mitigation of this criticism it should be added that the reviewer has already copied and used for teaching purposes many of the author's figures from the *Journal of Laboratory and Clinical Medicine*, where they originally appeared.]

The reader is made acutely conscious that red blood cells vary in size, thickness, and volume, in gross hæmoglobin content, and in the concentration of their hæmoglobin, and are not simply flat discs which vary in number, shape and staining reaction, which was the impression usually left in the mind of the student by the teaching of the older school of hæmatologists; also that the blood picture is not static, but dependent on an even balance between blood formation and blood destruction and that anæmias are due to disturbance of this balance. But, on the other hand, it is all made too mechanical and too easy, and in practice the physician will find that seldom can the individual case be reduced to such a simple formula.

There are many features in this book which appeal to the reviewer. Especially the emphasis that is laid on the 'normal' blood picture and its variation in different age groups, in the two sexes, and in different communities. However, in view of these great differences is it reasonable to employ 'indices'; these necessitate the adoption of a normal standard which in these circumstances has to be changed continually, or chosen arbitrarily. Why, when you can give the mean hæmoglobin content of a cell an absolute value (e.g., 29 micro-microgrammes), introduce a colour index which is dependent on two 'standards', for hæmoglobin and red cells, which, even as applied to normal adult males, are given variously as from 13.8 to 17.2 grammes and from 5,000,000 to 5,500,000, respectively, by different workers, and show a wider variation when infants and females have to be considered? The author further suggests that each hæmatologist should work out his own normal standards, by examining the blood of ten 'normal persons'. It is suggestions of this kind that give the adherents of the older conservative school of hæmatology an opportunity to jeer at the pseudo-accuracy of the modern hæmatologist, and justify their use of blotting paper and faded colour scales.

We commend this book—to the teacher in this country (but we beg him not to hand it over to his artist or photographer with an order to copy or make slides of all the figures; there are some very useful graphs and diagrams, and, if careful selection is made, he will find them invaluable for demonstrating the modern conception of the physiology of the erythron and the mechanism of anæmia)—to the hæmatologist of the advanced mechanical and statistical school, as a solemn warning—and to Dr. A. Piney, for he will, we are sure, find in it complete justification for his conservative, if not reactionary, attitude towards the subject.

Although more books like the former come from Great Britain and more like the latter from America than *vice versa*, these two books are not typical productions of the British and American schools of hæmatology, respectively, and, we are thankful to say, better books on hæmatology have emanated from each country.

L. E. N.

A HANDBOOK ON DIABETES MELLITUS AND ITS MODERN TREATMENT.—By J. P. Bose, M.B. (Cal.), F.C.S. (Lond.). Third Edition. 1938. Thacker, Spink and Company (1933), Ltd., Calcutta. Pp. xvi plus 272. Illustrated. Price, Rs. 7-8

Dr. Bose's well-known book on diabetes is one of the best on the subject. To the general practitioners in India, particularly to those in Bengal, where the incidence of diabetes is so high, this book has always been of great help in the management of their diabetic patients.

The third edition of this book has been brought up to date, and the outstanding advances in the subject made during the recent years have been incorporated. The different chapters have been thoroughly revised and partly rewritten, and new chapters have been added. The section on carbohydrate metabolism has been rewritten in the light of recent work of the author on phosphate and cholesterol metabolism. There has been some remodelling of the author's system of dieting and some new scales of diet have been incorporated. A new chapter on protamine zinc insulin discusses the 'insulin retard' group of preparations. The author is of opinion that 'protamine zinc insulin is a powerful weapon and is destined to prove more useful than ordinary insulin, its introduction certainly constitutes a step forward in the treatment diabetes'. This chapter is, by the way, reprinted from the author's recent article in this journal (*Indian Medical Gazette*, Vol. LXXIII, p. 390).

The different scales of diet, recipes suitable for diabetic patients, the tables dealing with the carbohydrate, protein and fat content, and calorific value of common food-stuffs of European and Indian dietary, will be found invaluable by physicians and their diabetic patients in planning suitable diets.

The reviewer believes that this book will prove extremely valuable to those for whom it is meant.

P. C. S. G.

GONORRHOEA IN THE MALE AND FEMALE: A BOOK FOR PRACTITIONERS.—By P. S. Pelouze, M.D. Third Edition, thoroughly revised. 1939. W. B. Saunders Company, Limited, London. Pp. 489. With 144 illustrations. Price, 27s. 6d.

In the preface, it is stated that this is not a textbook on gonorrhoea; it is just a simple story simply told. It is not difficult to discover that the well-merited success of this book is largely due to this fact. The present edition has been brought completely up to date by the inclusion of such subjects as hyperthermia, sulfanilamide and its derivatives and the oestrogenic hormones. Almost all the chapters have been amplified or rewritten; many new illustrations, charts and tables have been added and finally the author has kept before him the great change, since 1928, in the attitude of the profession towards this disease. Previously, it was 'publicly unspeakable and medically an outcast' but now the profession has awakened and his highly critical.

This book is conveniently divided into three parts. The first part deals with gonococcal infections in the male, the second with gonorrhoea in the female and the third with the medical profession and gonorrhoea control. The chapters on sulfanilamide are very informative and the author has taken pains to describe the symptomless carrier state produced by this drug. The efficacy of sulfanilamide preparations in gonorrhoea is not unknown to the public owing, largely, to the activities of sensational journalism. In some parts of North America, where certain women, we are told, have to undergo a form of 'medical inspection', they urinate and take a vaginal douche before they visit their doctor, and even take sulfanilamide for a few days prior to the 'study'. Sulfanilamide is being sadly abused in this way in the hands of unscrupulous persons.

We have much pleasure in recommending this book to the medical profession. The printing, binding and illustrations are all excellent. A useful index is appended.

P. N. R.

THE DIAGNOSIS AND TREATMENT OF DISEASES OF THE THYROID.—By James H. Means, M.D., and Edward P. Richardson, M.D. ('Reprinted from Oxford Monographs on Diagnosis and Treatment'.) 1938. Oxford University Press, London and New York. Pp. vii plus 367. Illustrated. Price, 21s. Obtainable from Oxford University Press, Bombay and Calcutta

The present volume forms a part of the series of the excellent monographs on 'Diagnosis and Treatment' published by the Oxford University Press. The joint authorship of an eminent physician and of a surgeon, and the fact that the work has been based on the personal experience of the authors over a period of twenty-three years tend to enhance the value of the work.

The object of the present work is to provide for the practitioner a convenient handbook containing up-to-date information regarding the various disorders of the thyroid gland, the modern methods of diagnosis and the more generally accepted methods of treatment.

The book covers the entire field of the diseases of the thyroid gland. It begins with the history of the development of our knowledge of the thyroid gland and then goes on to describe the functions and diseases of the thyroid. The principles underlying the diagnosis and treatment of the thyroid diseases have been very ably and clearly described in a separate chapter. Two special chapters have been devoted to discussion of the condition of 'exophthalmic goitre', one dealing with the aetiology, pathology, differential diagnosis, the clinical course, etc., and the other dealing very exhaustively with the various methods of treatment of the condition about which so many diverse views still exist. Summing up the discussion of the treatment of this condition the authors suggest that the best treatment at present for exophthalmic goitre, is 'sub-total thyroidectomy in an iodine remission'; the authors have cited numerous authorities in support of their claim.

The book has been written in a clear, lucid and simple style and it gives as much up-to-date information as may reasonably be required for the use of general practitioners, and we have pleasure in recommending the book.

J. P. B.

ROYAL NORTHERN OPERATIVE SURGERY.—By the Surgical Staff, the Royal Northern Hospital, London, and edited by Sir Lancelot Barrington-Ward, K.C.V.O., M.B., F.R.C.S. 1939. H. K. Lewis and Company, Limited, London. Pp. x plus 551. With 463 illustrations. Price, £2 2s.

ALTHOUGH there is no dearth of excellent handbooks on operative surgery, it will be agreed that a new one written by the surgical staff of the Royal Northern Hospital of London has more than justified its publication. It is the work of several experienced hands under the distinguished editorship of Sir Lancelot Barrington-Ward and is designed to represent, as far as possible, the practice of this well-known hospital. In order to keep the volume within reasonable limits and to make the work as practical as possible, the special subjects together with all archaic procedures have been omitted; as a rule 'one well-tried way of performing any given operation has been presented'. In short, we can describe this book as an epitome of modern surgical practice and technique.

Considering the vastness of the scope of modern operative surgery, the bulk of this book, consisting of 552 pages, may be considered to be very handy. Another noteworthy feature is the excellence of the illustrations, of which there are no less than 463 in this book. In fact, all the well-known traits of

Mr. Hamilton Bailey's works are reflected throughout. Altogether there are thirty-two chapters in this volume, adequately covering the requirements of general surgery. The first seven chapters deal with the head and neck with particular emphasis on important subjects such as the thyroid gland and the tongue. Then follows a chapter on the thorax, in which is given a good account of modern technique in thoracoplasty, lobectomy and mediastinal operations. The section on abdominal surgery, consisting of nine chapters, is preceded by a valuable summary of abdominal incisions. Six chapters are devoted to genito-urinary surgery and are followed by one on the breast and another on gynaecology. The concluding part of the book is devoted to bones, the spine and the nervous and vascular systems.

We are convinced that the book is a valuable contribution on operative surgery. Much credit is due to the editor and his colleagues for presenting us with a volume 'which is not a textbook of anatomical exercises but a live surgery to help and refresh the practising surgeon'. The printing and get-up are excellent. A useful index is appended.

P. N. R.

TRAUMA AND INTERNAL DISEASE: A BASIS FOR MEDICAL AND LEGAL EVALUATION OF THE ETIOLOGY—PATHOLOGY—CLINICAL PROCESSES—FOLLOWING INJURY.—By F. W. Spicer, A.B., M.D., F.A.C.P. 1939. J. B. Lippincott Company, Philadelphia and London. Pp. xix plus 593, with 43 illustrations. Price, 35s. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta

AFTER what must have been an extensive search through the literature on the subject, Dr. Spicer has produced a book on trauma and its effects on the human organism. The types of trauma selected for discussion are those that are thought to act as agents in the production or aggravation of disease. The book therefore omits any account of minor injuries, fractures of the limbs and the like that are purely surgical in character.

The subject-matter is arranged in chapters dealing with trauma and the various organs, such as the brain, heart, respiratory system, abdominal viscera, and so on. Then there are chapters on trauma and its relation to conditions such as tuberculosis, neoplasms, fat embolism, and diabetes. Each subject is introduced by a classification of the types of injury to the particular organ and their effects. Illustrative case reports are given, and the chapter concludes with a summary and a list of references. Treatment is not discussed as it is outside the scope of the work.

It is an especially valuable treatise because it was written on a clinical basis, and wherever a particular subject threatens to become unwieldy the author has had recourse to tabulation. Thus, the reader may be surprised to find that no less than fifteen conditions following injury to the pancreas have been listed. There is a strong medico-legal flavour about many parts of the book, and practitioners who have to engage in this sort of work will find many sections that render practical help, notably those on trauma of the brain, on syphilis and tumours.

Although there is very little in the book which calls for revision, with the exception of figure 25 which has been printed upside down, the subject is new and therefore many other points are likely to be suggested for inclusion in a future edition. For instance, unpleasant sequelæ may occur to labourers working in retort houses or handling compressed gases and pneumatic machines; and the effects of inhalation of noxious gases are known to result in internal disease.

As it stands, however, the book is an important contribution to modern medical literature, and should achieve wide popularity.

W. McN. N.

SURGICAL PATHOLOGY OF THE DISEASES OF THE MOUTH AND JAWS.—By A. E. Hertzler, M.D. (Hertzler's Monographs on Surgical Pathology.) 1938. J. B. Lippincott Company, Philadelphia and London. Pp. xvi plus 248, with 206 illustrations. Price, 21s. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta

THE publication of the present volume completes a series of ten volumes or monographs by Dr. Hertzler on surgical pathology. The author deserves great credit for the successful termination of a difficult and arduous task. This volume consists of twelve chapters dealing with surgical diseases of the mouth, lips, tongue, larynx and jaws. The photographs and reproductions of histological sections are all excellent. This book has the distinction of being a monograph on a special subject, written by a general surgeon of ripe experience and rare courage. On the whole, it is written with robust common sense deserving of praise, but there are some statements which may call for criticism. Von Bergmann, it is stated, once said in his thunderous voice: 'There are but three common diseases in the mouth, tuberculosis, cancer and syphilis'. The author is at pains to point out that in his own district, 'the short grass country', both syphilis and tuberculosis are rarities; 'the rarity of the first being due to high moral standards, and of the other to the high general state of nutrition'. It may be remarked that this book is not dealing with conditions prevalent in the author's district only and it is quite possible that the same high standards do not prevail in other parts of his country.

The bibliography at the end of each chapter is fairly exhaustive but the author's remarks in the preface, needlessly provocative, are deserving of condemnation. 'It is difficult to collect a literature after a book has been written. . . . I have always held the idea that one has no right to quote literature which he had not read in the original. I have been sorely tempted, in this final round, to go into the market and buy citations at four cents a piece, the current rate. However, I have adopted the more respected practice of having my secretary copy them out of the Cumulative Index. Therefore, if the papers cited are not good, do not blame me, I have not read them.' Such arrogance is not found in a student of science and a seeker after truth. Admittedly it is not always possible to read foreign contributions in the original, but surely in the author's own country and language, there is available a literature of sufficient merit to command his interest and attention.

P. N. R.

THE PRINCIPLES AND PRACTICE OF OPHTHALMIC SURGERY.—By E. B. Spaeth, M.D. 1939. Henry Kimpton, London. Pp. 835. Illustrated with 413 engravings containing 1,031 figures and 4 coloured plates. Price, 45s.

NOWADAYS, in order to encompass the widening field, exhaustive treatises on surgical subjects are usually compilations by several contributors. However, this large textbook on ophthalmic operative surgery is, with the exception of one or two sections, the work of a single writer. But Dr. Spaeth has correlated the work of numerous surgeons throughout the world so successfully that his book has none of the disadvantages attending a 'one man show'. Much of his own work is presented, but it is all well worth reading and does not displace the prior claims of the work of others. In many instances he quotes *in extenso* from other authorities; the section on gonioscopy has been contributed by Dr. Otto Barkan, and that on corneal grafting by Dr. Ramon Castroviejo.

The book opens with a chapter on anaesthesia and operative and post-operative technique. Chapters then follow in a systematic manner, describing in turn the surgery of the orbit and lacrymal apparatus, the muscles, eyelids, the globe and its contents, and so on. The sections on the lids and ophthalmic plastic surgery appear to take a lion's share of the book, perhaps because the author's special interest lies therein. But

no section has been skimmed, so that an admirable balance has been preserved.

Numerous diagrams and photographs illustrate every section, though many, through considerations of space, have been so reduced as to become almost unintelligible. The extensive bibliography is, so far as we can verify, accurate, and readers in this country will be interested to find that much attention has been given to the work of surgeons in India.

We have no hesitation in recommending this book to ophthalmologists, and students working for the higher diplomas should certainly read it.

WORTH'S SQUINT OR THE BINOCULAR REFLEXES AND THE TREATMENT OF STRABISMUS. Seventh Edition by F. Bernard Chavasse, M.A., D.M. (Oxon.). 1939. Baillière, Tindall and Cox, London. Pp. xxii plus 688. Illustrated. Price, 25s.

It is gratifying to find that Worth's classical monograph was not allowed to become out of date when its original author was no longer able to undertake another revision. But after a lapse of ten years such great advances have been made in this subject that the new author, in part in collaboration with the late Mr. Worth himself, has found it expedient to rewrite the book entirely.

That Dr. Bernard Chavasse has achieved this brilliantly is at once apparent. The opening chapter is a conspectus of what is contained in the rest of the book; having first run through this, the reader is able to assimilate more easily what is undoubtedly a most difficult subject.

The first section deals with the anatomy, and the anatomical and reflex development in the child. This contains much new work, and throughout one is impressed with the knowledge that many of the old concepts on which we were brought up, and which are still being taught, must be abandoned. In fact the old ideas have been left so far behind that one wonders how much orthoptic work is being carried on on a basis of entirely wrong assumptions—but practitioners of the present methods of squint training must read the book and judge for themselves. The real significance of the exposure of the old clichés 'essential alternation', 'congenital defect of the fusion faculty', and so on, can hardly be appreciated by the general reviewer.

The last part of the book discusses in detail the treatment of squint according to the particular state encountered; the methods chiefly relied on are the use of glasses, occlusion, and operative correction.

Although the book contains nearly three times as many pages as the previous edition the subject is presented concisely, but nevertheless with a polished style that is a model of what medical writing should be.

W. McN. N.

A TREATISE ON THE SURGICAL TECHNIQUE OF OTO-RHINO-LARYNGOLOGY.—By G. Portmann. Translated by P. Viole, M.D. 1939. Baillière, Tindall and Cox, London. Pp. x plus 675, with 474 illustrations and 2 coloured plates. Price, 57s.

This is a translation of a book by a well-known continental surgeon in which he describes the procedures he employs in his clinics.

Each operation which is described is arranged according to a simple plan. The description is grouped under seven or eight headings, namely, indications, contra-indications, preparation of the patient, anaesthesia, instruments, technique, post-operative care, and sequelae. A telegraphic style is used, the actual operation is given step by step, and the whole is illustrated by a great number of large drawings together with photographs of the instruments arranged on the surgeon's and assistant's trays. This system makes for easy reading and rapid cross-reference, and has enabled the author to save space by avoiding much tedious repetition.

As the book is an account of Dr. Portmann's own operative methods and purposely describes only one

operation for each affection, criticism of operative technique seems out of place. On the contrary, there can be nothing but praise for what has been presented. But it is an incomplete work, if only for the reason that the whole field of peroral endoscopy is omitted.

It is a beautiful book, carefully printed and bound, but its price is beyond the means of the average student.

W. McN. N.

CLINICAL PATHOLOGY.—By P. N. Pantton, M.A., M.B., B.C. (Cantab.), and J. R. Marrack, D.S.O., M.A., M.D., B.C. (Cantab.). Fourth Edition. 1939. J. and A. Churchill, Limited, London. Pp. x plus 502, with 12 plates and 50 illustrations in the text. Price, 16s.

In the fourth edition of this well-known book on clinical pathology the various laboratory methods employed in the modern investigation of disease are fully described. The book is divided into nine sections, the first section dealing with the blood in health and disease, its chemical composition and the method of examination; the second section is devoted to parasitology and related subjects. In the third section is given an excellent account of the methods employed in the examination of 'puncture' fluids or fluids whether exudates, transudates or the contents of cysts as are commonly removed for examination by means of a needle and syringe. The next four sections deal with the examination of various 'systems' of the body. Then follows a brief account of the examination of sections of tissues and a useful summary of histological methods. The final chapter which is a new one in this edition deals with the pregnancy tests. The directions given for the various tests are concise and complete and clinical laboratory workers will find in this book much that will be of great help in the multifarious duties that such a laboratory has to undertake. This book will be specially of value to the advanced student of medicine, in understanding the various laboratory methods employed in the investigation of disease.

CLINICAL BACTERIOLOGY.—By F. A. Knott, M.D., M.R.C.P., D.P.H. 1939. J. and A. Churchill, Limited, London. Pp. viii plus 426, with 60 illustrations including 12 plates. Price, 12s. 6d.

THE most difficult problem that the medical teacher of to-day has to face is to decide on the scope of his lectures. It is easy enough for him to acquire very special and detailed knowledge on his own subject, but there are limits to the powers of assimilation of the student, who is studying half a dozen subjects at the same time. There are some excellent textbooks on bacteriology, e.g., Topley and Wilson's and Gay's, but these two books run to 1645 and 1581 large pages, respectively. It is out of the question to let the undergraduate student attempt to learn his bacteriology from such books and the bacteriological synopses are often unsatisfactory.

The present author has attempted to write a book that will give the student all the bacteriology he requires for the ordinary professional examinations and at the same time will help him in practice after qualifying. He can learn from it the methods of carrying out the simpler bacteriological procedures, and, what is far more important, the clinical application of the results of these. He will find up-to-date information on the tests it is worth while doing or recommending in various diseases, and on the interpretation of the reports that are sent to him. For example, there is a very good account of the antigenic structure of the enteric group of organisms with an explanation of the co-agglutinations that may occur and of the significance of H and O agglutinations.

One can unhesitatingly say that the author has succeeded. He has produced a book of moderate size which contains all that the student and the average practitioner need know on the subject and the information is as up to date as it can safely be.

CLINICAL BIOCHEMISTRY.—By Abraham Cantarow, M.D., and Max Trumper, Ph.D. Second Edition. 1939. W. B. Saunders Company, Philadelphia and London. Pp. 666. Price, 27s. 6d.

WE had the pleasure of reviewing the first edition of the book seven years ago. On account of the great amount of knowledge gained since, the text has been revised thoroughly. Some of the chapters have been entirely re-written and several additions such as the influence of some of the endocrine glands and vitamin B on carbohydrate metabolism, the biochemical aspects of vitamin deficiency, some of the aspects of mineral metabolism, etc., have been made. The change in the title of the book from 'Biochemistry in internal medicine' to 'Clinical Biochemistry' appears to us to be an improvement as the latter expresses the object of the book, *viz*, the application of biochemical observations in clinical medicine, more forcibly.

There can be no doubt that during the last few years biochemistry has made such rapid progress that it has now proved itself to be an important and powerful ally of clinical medicine, not only in the discovery of causes and cure of some important diseases, notably those of metabolism and nutrition, but also in the assessment of the prognosis in a given case. It also helps us considerably in the study of the functional efficiency of certain important organs and systems. The importance of the part which biochemistry plays in the practice of medicine is therefore undisputed.

The attempts of the authors in bridging the gulf between abstract biochemistry and clinical medicine deserve special praise and the clear, concise, and simple style of dealing with a highly scientific and technical subject is admirable and has made the reading of the book easy and enjoyable.

The book is up to date and deals with recent developments in the science of biochemistry in its relation and application to clinical medicine. The busy practitioner, who has no time to read elaborate textbooks or monographs, will profit considerably by the perusal of this book and will find that many of his conceptions of the biochemical changes in health and disease have undergone either radical changes or suffered considerable modifications. We have no hesitation in recommending the book to all who desire to have a clear understanding of the significance and limitations of laboratory investigations.

J. P. B.

OUTLINE OF ROENTGEN DIAGNOSIS: AN ORIENTATION IN THE BASIC PRINCIPLES OF DIAGNOSIS BY THE ROENTGEN METHOD.—By Leo G. Rigler, B.S., M.B., M.D. 1938. J. B. Lippincott Company, Philadelphia and London. Pp. vii plus 212, with 254 illustrations. Price, 30s. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 22-8

IN this book the author has collected his lecture notes revised and expanded to meet the demands of advanced instruction to graduates and radiologists. For this reason in the author's words 'it is in no sense a reference book, but rather a synopsis of a very extensive subject'.

The outstanding feature of the work is the collection in atlas form, with cross references in the text, of the 254 illustrations including a number of drawings by Jean E. Hirsch. The descriptions appended to these are sufficiently elaborate to admit of study independently of the text.

The unique drawings by Miss Hirsch are particularly worthy of study, although, in the reviewer's opinion, sketches and drawings of this nature can never replace good reproductions of actual skiagrams.

Owing to the method of presentation the accounts given of even some of the common diseases and procedures such as are connected with the introduction of iodized oil into the lungs and spinal canal, are

somewhat meagre. The section on the female generative organs also is very inadequate.

It is a work of considerable usefulness in that it adds to our collection of mental pictures of various conditions, but it cannot be described as a complete, or nearly complete, exposition of the subject, much less a *magnum opus*.

A word of congratulation is due to the publishers for the artistic manner in which skiagrams, sketches and drawings are reproduced.

PATHOLOGICAL TECHNIQUE: A PRACTICAL MANUAL FOR WORKERS IN PATHOLOGICAL HISTOLOGY INCLUDING DIRECTIONS FOR THE PERFORMANCE OF AUTOPSIES AND FOR MICROPHOTOGRAPHY.—By F. B. Mallory, A.M., M.D., S.D. 1938. W. B. Saunders Company, Philadelphia and London. Pp. 434. Illustrated. Price, 20s.

THIS is a book which will prove a most useful companion to practical work, whether in the laboratory, the post-mortem room or the museum. The technical methods that practical experience has shown to be of value are described. The book is divided into three parts, the first deals with general laboratory equipment and histological methods, the second with special histological methods and the investigation of miscellaneous infectious agents and the third part contains direction for the performance of autopsies. There are concluding chapters on photography and certain useful laboratory methods. Each section is dealt with in a practical way and the directions are given in such a manner that with persistence and experience any worker can get satisfactory results. The book can be confidently recommended to all students and workers of pathology.

PRACTICAL CHILD-PSYCHOTHERAPY.—By Curt Boenheim. 1938. John Bale Medical Publications, Limited, London. Pp. 177. Price, 10s. 8d.

THE value of this little book would be greatly enhanced had it been provided with an index. The absence of an index is all the more remarkable in view of its author being a German.

The author is to be congratulated on his cautious approach to a difficult and much disputed field of therapy. He is fully aware of the debt psychotherapists of every school owe to the pioneer work of Freud, Adler, Jung and Stekel. Most, indeed, of the authorities whom he quotes are non-British. The author warns his readers against accepting too hard-and-fast a concept of 'normality', particularly in children who are in a state of development so that what is normal in children to-day may be pathological to-morrow.

In his review of the psychotherapeutic methods at our disposal for the treatment of children, the author discusses the value of psycho-analysis, observing children at play, hypnosis, rest, relaxation and exercises. In dealing with the principal behaviour disorders in children, the author does not seem to lay much stress on 'conflict' as a basis of such types of disorder. He is more inclined to find the causes of psychic ailments in children to lie in their environment, particularly as regards the poverty of the home and the temperament of the parents. This outlook could only be definitely established after a comparative study of 'home' conditions among a much bigger range of family life, including, of course, the family life of primitive people. The author does well to emphasize the main difficulty in child-psychotherapy, namely, the psychopathy of the parents. No one who has practised child psychotherapy will deny that the main obstacle to successful treatment of children is the obstructive attitude of their parents which is moreover often very subtly expressed.

The author has some interesting observations on the part played by 'imitation' in childish ailments, particularly ailments involving circulatory and respiratory affections. The author's treatment of non-epileptic 'fits' in children is rather unsatisfactory. The subject is much more complicated than he would appear to

imagine. In spite of these and some other defects, a book on the psychotherapy of children should be welcomed by medical practitioners in this country where so much ignorance still exists on the subject.

AN INTRODUCTION TO DERMATOLOGY.—By Norman Walker, Kt., M.D., LL.D., F.R.C.P., and G. H. Percival, M.D., Ph.D., F.R.C.P. Tenth Edition. 1939. W. Green and Son, Limited, Edinburgh. Pp. xvii plus 391, with 102 plates and 96 illustrations in the text. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 14

This book has been one of the best known and most widely used small books on skin diseases for the past forty years, as the first edition appeared in 1899. It is remarkable in that the original author is still active in its production, though he is now assisted by a collaborator.

Although it may be still classed as an introduction to dermatology it is much larger than it was about thirty years ago when the reviewer first made its acquaintance. Many additions have been made as our knowledge of skin diseases has advanced, but re-classification in accordance with improved knowledge appears to have been ignored. For example, very nearly three hundred pages of the three hundred and eighty-one of text which the book contains occupy one section under the heading 'Inflammation'. It is true this is divided under sub-heads but, to take a haphazard selection from the contents pages, when one finds chilblains, lupus erythematosus, hydroa, pemphigus epidermolysis bullosa, and herpes following each other in that order it is rather confusing. It is also unusual at the present day to find verruca and molluscum contagiosum among the 'new growths'.

Apart from this comparative absence of grouping the book is an eminently practical production and is full of valuable tips, it is also unusually well furnished with well-produced colour plates for a book of its size, and it can be recommended to the general practitioner as his handbook on dermatology.

P. A. M.

COMPARATIVE STUDIES CONCERNING THE STRENGTHS OF ņSTROGENIC SUBSTANCES.—By Kaj Pedersen-Bjergaard. 1939. Oxford University Press, London, Humphrey Milford. Pp. 198. Illustrated. Price, 15s. Obtainable from Oxford University Press, Bombay and Calcutta

ALTHOUGH the introduction of the international ņstrone standard in 1933 removed the long-felt want of a constant unit of measurement for the biological determination of the activity of ņstrogenic substances, it was soon found that this standard preparation was not suitable for the comparative testing of all ņstrogenic substances, and hence, in 1936, another standard, 'The ņstradiol mono-benzoate standard' was introduced, in addition, as the unit of measurement for the biological determination of benzoylated ņstrogenic substances. This also was found to be not wholly satisfactory.

The present monograph, written for the purpose of elucidation of the problem of assaying the biological activities of the different ņstrogenic substances, appears to be a great step forward in the realm of sex hormones. The applicability of the international standard preparations as bases for comparison in the assay of other pure ņstrogenic substances and their esters, as well as of the mixtures of more or less purified ņstrogenic extracts has been tested in a series of experiments on various kinds of animals and with varying methods of administration.

The amount of laborious and painstaking experimental work which the author has incorporated in the monograph is amazing, and will no doubt make the work of future workers on the subject much easier. It is very comprehensive and illuminating and will be invaluable to those who are interested in this particular branch of endocrinology.

J. P. B.

MEDICINE FOR NURSES.—By W. Gordon Sears, M.D. (Lond.), M.R.C.P. (Lond.). Third Edition. 1939. Edward Arnold and Company, London. Pp. viii plus 447. Illustrated. Price, 8s. 6d.

This is an excellent book, and one that should prove very helpful for senior nurses studying for their final examination.

It is simply and clearly written, also well tabulated, covering all branches of medical nursing that the student nurse is expected to know.

C. F.

AEQUANIMITAS WITH OTHER ADDRESSES TO MEDICAL STUDENTS, NURSES AND PRACTITIONERS OF MEDICINE.—By Sir W. Osler, Bt., M.D., F.R.S. Reprinted from the Third Edition. Biographical Note by Sir W. Langdon-Brown, M.D. (Cantab.), F.R.C.P. 1939. H. K. Lewis and Company, Limited, London. Pp. xiv plus 451, with a portrait. Price, 7s. 6d.

THE detailed review is unnecessary of this classic, which has been in constant demand since its first appearance in 1904. The present edition has been reprinted in England from the third edition which appeared in America in 1932, and it marks the fourteenth actual reprinting of the book.

It contains twenty-two addresses delivered by Sir William Osler in America and Canada up to the year 1905 when he left the United States for Oxford. This edition has been enhanced by the inclusion of an excellent photograph and a short bibliographical note by Sir Walter Langdon-Brown on the author, which supplies an insight into the lovable character of this great man and helps one to understand how he was able to write such a collection of speeches all of which contain valuable advice for the medical student and young practitioner.

It is a book that every medical student should read and read again. In it at the end Sir William has given a list of ten books which he recommends as a bed-side library for medical students; this might very well be increased to eleven by the addition of *Aequanimitas*.

P. A. M.

SHORT NOTES ON LEPROSY.—By Dr. D. N. Mukherjee, M.B., B.S. (Lucknow), Leprosy Specialist to the Government of Central Provinces and Berar, Raipur. 1938. Published by the Author. Pp. 25. Price, As. 2 per copy

IN the limited space of this little booklet the author has tried to deal with all the different aspects of leprosy—classification, clinical manifestations, diagnosis, differential diagnosis, laboratory tests and control of leprosy. The description has naturally to be very brief. The type and paper used is quite good but there are several printing mistakes. The author makes no mention of the presence of thickened nerves as one of the cardinal points in diagnosis of the disease. The booklet is quite cheap at two annas and will be useful to health visitors employed in anti-leprosy work.

GROSS ANATOMY: A BRIEF SYSTEMATIC PRESENTATION OF THE MACROSCOPIC STRUCTURE OF THE HUMAN BODY.—By A. B. Howell. 1939. D. Appleton-Century Company (Incorporated), New York and London. Pp. vii plus 403. Illustrated. Price, 25s.

IN his introductory chapter, the author deplores the tendency of the average textbook to become a book of reference from which, nevertheless, the student tries to learn anatomy without the aid of the cadaver. On the other hand he indicts the dissecting manual because the student 'looks for what he is told to seek and tends to ignore other details, thus dulling resourcefulness and initiation (*sic*)'.

Though not wholeheartedly endorsing these views, it was with some interest that we turned to the subject-matter of the book, hoping that perhaps Professor Howell had produced some system that would

case the burden of the student who is about to embark on the study of anatomy. We were disappointed.

The book is arranged along formal lines, and much care has been devoted to the introduction of each section, in which the student is given a general survey of the anatomy to be described from the developmental and morphological aspects. But in several instances there has been so much deviation into the realms of embryology and comparative anatomy that most students will find themselves *rari nantes in gurgile vasto*.

The bulk of the book consists of detailed anatomical description on the lines of, but shorter than, that found in the standard textbooks. The explanation of the paucity of illustrations is to be found in the introduction, in which we read that the student is expected to have at hand 'any good atlas of anatomy'. No suggestion is made that he should also supplement his reading by a study of the living body, the cadaver, and the skeleton.

W. McN. N.

Abstracts from Reports

KASHMIR MEDICAL MISSION OF THE CHURCH MISSIONARY SOCIETY: REPORT FOR 1938

ALTHOUGH much progress has been made by the State in recent years in Kashmir, there is still much unalleviated sickness and suffering. The Mission Hospital is not the only medical institution in Kashmir. In Srinagar there is a State General Hospital and also two women's hospitals. There is also a tuberculosis sanatorium and a leper hospital. In most of the larger towns and villages there are dispensaries where patients can receive treatment and medicine. The large number, both of out-patients and of in-patients, that come to us year by year, is an indication of the high esteem in which this hospital is held by the people of Kashmir.

On the medical side, consumption is very rife. This year a special tuberculosis clinic has been held twice a week to deal with the large number of patients that come to us. A new form of injection treatment has been tried, but it is early yet to state how successful it is.

Several cases that have been operated upon this year for abdominal conditions have been proved at the operation to be malignant. We have had cases of cancer of the stomach, bowel, breast, mouth, eye and limbs.

Venereal disease is rampant in Kashmir. Patients usually come to hospital in the secondary or tertiary stages, and late manifestations are all too common. A venereal disease clinic is held twice weekly, and the routine treatment with blood tests is carried out. An interesting fact about syphilis in Kashmir is that it seldom affects the nervous system. Tabes dorsalis and general paresis are almost unknown. Indeed, nervous diseases of any kind are rare, although there has recently been a case of chorea, and a case of paralysis agitans in the hospital. Another interesting medical anomaly is that while rheumatic heart disease is exceedingly common, acute rheumatism is very rare. Neither is rheumatoid arthritis met with in Kashmir.

Typhoid is endemic and we usually have cases in hospital. It is seldom virulent and most cases recover. Dysentery is common and is usually amœbic, responding well to emetine treatment. This year there was a mild outbreak of cholera. It did not prove serious and there were only a few cases.

On the surgical side, osteomyelitis is by far the commonest disease. It affects the underfed and those exposed to manual work. It is more common in men and boys than in women and girls. The leg and thigh bones are more frequently affected than the bones of the arm or forearm. Most cases come to hospital in the chronic stage, and we usually perform an osteotomy or sequestrectomy. Tuberculosis affecting bones and joints is becoming increasingly common, and we are seldom without several cases of tuberculosis of the hip, knee or ankle in the wards.

A large number of abdominal operations have been performed. Appendicitis is fairly common, and so are gastric and duodenal ulcers. For the latter conditions we frequently perform gastro-enterostomy. Gall stones are not infrequent, and occur more commonly in women than in men. Stones of the bladder and kidney

are less common than in the hotter parts of India, but we have had several cases during the year. Hydatid cysts of the liver, intestinal obstruction, abdominal tuberculosis and ovarian cysts have contributed to our list of abdominal operations. Goitres, hernias, hydroceles and hæmorrhoids are all very common. Cataract and trichiasis are the commonest eye operations.

A word concerning the background of these patients. The majority of them live in squalor and poverty scarcely believable to those living at home. Their diet consists of rice, vegetables, milk and a little meat. In terms of calories the food value of this diet is very small—very much less than is theoretically required for a healthy person. Small wonder that they are undernourished and succumb so readily to disease, and small wonder that few live to reach an old age.

In this hospital we are trying to alleviate some of the sickness and suffering in Kashmir. There are many people who have been patients here, who are grateful to those who support this hospital, and make this work possible. We hope that all those who have so generously helped us in the past will still continue to do so in the future.

REPORT OF THE MEDICAL RESEARCH COUNCIL, LONDON, FOR THE YEAR 1937-1938. PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE, LONDON. PRICE, 3s. 6d. POSTAGE EXTRA

It is now twenty-five years since the Government decided to promote medical research by setting up the Medical Research Committee, which became the Medical Research Council in 1920. In this period there has been a great increase in medical investigations in Great Britain, some of which are undoubtedly due to the support provided by the State. In other countries there has been a similar acceleration in intensity of medical discovery, particularly in the United States of America, where it has been made possible mainly by private endowment. All this activity has brought about a great increase in knowledge of the body in health and disease—greater even than that of the previous twenty-five years, which in itself was large. Historians are likely to pronounce this period as outstanding in the improved level of health of civilized communities made possible by the access of knowledge won by medical research.

THE APPLICATION OF KNOWLEDGE IN TREATMENT

Apart from its effect in raising the standard of health and physique, this new knowledge has had two influences which, in their effect on medical practice, are often opposed to each other. It has resulted in the first place, in a great improvement in methods of diagnosis and treatment of disease. These discoveries, together with the development of the social conscience of the community in regard to the unhealthy individual, have involved a vast increase in medical services. The number of medical men, both in public and private practice, has increased greatly, hospital accommodation

and facilities have multiplied, and the total cost of medical care has risen enormously. The development of new methods of diagnosis and treatment has called for so much additional personnel and costly apparatus that it has become more and more necessary for the sick to enter public institutions in order to receive the full benefits now available. The radiographic department, the biochemical, the hematological and the bacteriological laboratories, which hardly existed twenty-five years ago, are now large and important factors in all efficiently run medical institutions. Hardly a patient enters such an institution whose condition does not call for the help of these newly grown hospital services.

While everyone will agree that all these changes have been justified and beneficial, there must often pass through the mind the question—what is to be the end of this development? Will medical science with its ever greater knowledge require hospitals and their scientific services to grow continuously; are there to be no limits to their size? The economist might even wonder whether a time will not come when the expense and trouble involved will hardly justify this extension of medical practice, especially that large part concerned with chronic and degenerative forms of disease and for which the practical return in terms of human health is often small.

This, of course, is only one aspect of the matter. The whole trend of medicine in the present century has been to study the basic etiological factors of individual diseases in order to find methods for curing them, and it is to the application of this side of medicine that the extended hospital services are mainly directed. A large number of diseases of which treatment at the beginning of the century was essentially concerned with the relief of symptoms and the comfort of patients—leaving the cure to the care of *vis medicatrix naturæ*—can now be cured or controlled by specific remedies and the sufferers returned to normal healthy existence. Many thousands of patients suffering from diseases which, twenty-five years ago, were incurable and uncontrollable, can now be restored to health as the result of recently acquired knowledge applicable to diagnosis and treatment.

Applications of chemotherapy.—It sometimes happens that new knowledge of curative treatment may in itself also bring about reduction in incidence of disease, as, for instance, in infectious diseases and those of a chronic nature. This will probably prove to be the case in some infectious diseases following the recent advances in treatment by sulphanilamide and allied substances. For example, the more rapid and effective cure of gonorrhœa by these drugs ought to result in a definite reduction in its incidence, not only because of their curative action but because they may reduce the spread of the infection.

Recent results give hope also that these drugs may lead to the reduction of one of the most common chronic disabilities, namely, middle ear disease, which often follows measles and scarlet fever or may be a sequel to a sore throat due to streptococcal infection. If the claims that it has a powerful destructive effect on the middle ear can be proved to be true, it ought to have a powerful curative effect to those cases of middle ear disease which are due to this organism. How enormous such preventive effects might prove can be estimated from the fact that there are said to be 2,500,000 people in this country with disabling degrees of deafness, and that disease of the middle ear is admittedly responsible for a large proportion of these cases. Thus it has been estimated that this condition is responsible for 90 per cent of all cases of acquired incomplete deafness in children. It is obvious that optimum results along these lines will be obtained only by medical skill alert to the development of the condition, especially in young children, and to the need for immediate treatment by the chemotherapeutic agents now available. A good opportunity may well be at hand for seriously attacking middle ear disease and reducing greatly this widespread and serious disability and its sequelæ, running ears and deafness.

APPLICATION OF KNOWLEDGE IN PREVENTIVE MEDICINE

On the other hand, medical research has brought another kind of knowledge which, if properly used, leads directly to the prevention and elimination of disease. The effect on medical practice and its ancillary services of this kind of knowledge is clearly opposed to the first-mentioned effect since, by eliminating disease, it tends to reduce the needs for curative aids.

In view of the large increase in hospital services and medical personnel in recent times, it might be thought that the results and effects of research in preventive medicine must be negligible. This is not, or ought not to be, the case; but undoubtedly there is often great delay in bringing about the application of new discoveries to preventive ends. Fresh means of curative treatment, on the other hand, are generally applied at once by medical practitioners, and the latent period between such discoveries and their application is often short.

Everybody will agree that, of the two types of knowledge, that which leads to the eradication of disease is much the more important to the community. Why then should there be great delay in its application? No simple answer can be given to this question. Prophylaxis against disease does not depend solely on the alertness of medical men or of Government departments to procure rapid application of new knowledge. Just as important is enlightenment of the public as to the merits of a particular discovery, since these applications of medical science often require direct action on the part of individuals. The public, however, cannot understand the merits of such very technical subjects unless they are clearly expounded and the meaning of the results driven home. Again, successful cure of disease is always dramatic, and brings with it intense relief both to patients and their friends. There is, however, nothing dramatic about the disappearance of disease. It is here to-day and gone to-morrow, and the very success of prevention of disease is measured by forgetfulness. Whoever thinks nowadays of the decimation once caused in this country by plague, cholera, typhus and other diseases now eliminated from our midst? The relative lack of dramatic interest in the prevention of disease, as compared with that in its cure, is partly responsible for the difference in rates with which their advantages are obtained by the public. A third cause of delay is the fact that preventive medicine mostly concerns children, and it is curious that illness and death in the young do not, apparently, impress themselves on the public mind with the emphasis associated with disease in the adult.

It is becoming every day more clear that these difficulties in matters of health and disease, especially when the co-operation of the public is necessary, will remain so long as there is no means of educating and giving them the requisite guidance. It does not seem to be anybody's business in this country to undertake this task. Only too often are the public dependent for information and guidance on advertising propaganda, and as it so often is, financed by those who sell. Others who are most assiduous in those who believe that advances in medicine, especially when of great practical value, are snares and delusions, and who by extensive propaganda mislead in every conceivable way and hinder the process of application.

It is not the duty of the Medical Research Council to guide the public on the importance of medical discovery in its practical applications to human needs. Their task is wholly to promote discovery and to announce it to the world when it is made. They cannot but view with regret, however, the delay which so often occurs between medical discovery and its application, especially when the discovery is one that provides an immediate opportunity of preventing or even eliminating disease. What the ultimate solution of this difficulty will be is not obvious, but with the present increase in knowledge of methods of preventing disease, a better method of informing and educating the public becomes imperative.

The prevention of diphtheria.—One of the most striking instances of the delay in the application of new knowledge is the relative lack of public recognition, in Great Britain at the present time, of the existence of a method of proven value for the prevention of diphtheria. Diphtheria is the commonest single cause of death among school children. In 1937, there were 61,339 cases of this disease in England and Wales, causing 2,963 deaths, nearly all in children between the ages of 1 and 15 years. This is pure tragedy, in view of the needlessness of such deaths, for since 1929 prophylactic inoculation against diphtheria has proved increasingly successful wherever it has been properly used.

The value of improved nutrition.—A second type of preventive measure against disease, of which the proper application has now been delayed for many years, is to be found in improved nutrition. The need for this has been often discussed in previous Annual Reports of the Council; but the adoption of modern teachings on the subject by the public is depressingly slow, in spite of the evidence often advanced that the increased consumption of protective foods would not only be beneficial to the physique and general health of the people but also of great economic value to the country.

Better feeding in infancy has caused a gratifying reduction in rickets throughout the country, although the time has not yet arrived when an incident would be possible here such as recently occurred at the Children's Hospital at Toronto, where a case of rickets created such surprise that a meeting of staff and students was summoned to examine the baby. There is still room for great improvement in this respect, for, with the knowledge and public assistance available, the persistence of rickets in this country is an indication of ignorance or neglect. It is of interest to recall that an attack on the problem of rickets was included in the first research programme of the original Medical Research Committee in 1914, and that it is owing to the results of this work that the disease can now be prevented.

A much greater consumption of milk, and other dairy products, of eggs, of vegetables, including potatoes, of fruit, and of fat fish, at the expense of bread, biscuits, sugar and sweets, especially in early life, is an urgent national requirement; it will not only improve the physique of the people but will reduce the amount of dental decay and greatly raise the standard of health. An increase in breast-feeding will still further reduce the high mortality rate of infants from gastro-intestinal troubles and bronchio-pneumonia. Whatever advances in medical knowledge may come, until these simple precepts are adopted there will still remain a great deal of preventable disease in this country.

The co-operation of the public.—These few instances will probably suffice to emphasize the possibilities of applying the results of medical research to immediate problems of preventive medicine. It is clear that some of the methods for preventing disease require close co-operation on the part of an enlightened public. There is great need for some authoritative body to transmit the necessary information which will stimulate public co-operation. With a more rapid understanding of the facts on the part of the public, delay in application of new knowledge to human needs ought not to be so long as it has been in the past. Only by improving the general health and eliminating disease can it be hoped to reduce this present tendency of ever-increasing medical services, and the annual expenditure of between two and three hundred million pounds which such services necessitate.

RESEARCH POLICY

While the Medical Research Council must necessarily be interested in the general problem of the practical application of new knowledge, they are more directly concerned with the question of the best methods of promoting the research work itself. The over-riding consideration must obviously be the acquisition of knowledge which will make possible improvement in the standard of mental and physical health, and the prevention, alleviation and cure of disease. It is by no means

certain, however, by what policy such knowledge may be most quickly and effectively obtained. Some think it is to be done by directing attention to disease itself, and others by promoting fundamental studies of the physiology and chemistry of the body. These views need not be discussed further, because it cannot be doubted that knowledge of practical significance in matters of health and disease can come from any direction. The work of Pasteur on fermentation led to the work of Lister on prevention of wound infection. On the other hand, the discovery of Eijkman of the cause of beri-beri led ultimately to more academic researches on the part played by vitamin B₁ in the oxidation of carbohydrate. Experience has shown that experimental work from any quarter may lead to the solution of problems from any other quarter.

The question may then be asked, what is the policy of the Council in promoting research? Do they initiate research, and, if so, in what way; or do they leave to individuals the choice of subject and support it if satisfactory? Do they favour research on disease itself rather than on more academic problems of physiology and biochemistry? A complete answer to these questions cannot be given here, but the general situation stands as follows. Actual promotion of specific research by the Council is usually done by appointment of individuals to their permanent staff. This choice depends on the subject which seems to require special attention and the merits of the person chosen. When once appointed the individual has wide liberty of action in planning investigation. The Council seldom choose particular diseases for investigation; generally, the choice is of a broader nature, so as to include study of an aetiological factor common to a group of diseases, or a type of treatment of wide application, or a system of physiological or biochemical control.

Examples of such broad subjects of investigation at the present time are virus diseases, endocrinology, and chemotherapy. In each of these cases groups of workers have been appointed to follow lines of investigation in their own province and they are expected to be familiar with, and prepared to help, researches cognate to their own throughout the country. If suitable opportunity offers itself, investigations by other workers in the same fields are also assisted by the Council. By this means co-ordination of effort throughout the country is brought about.

For another large part of the work, helped by the Council by means of personnel and expenses grants, the initiative in choice of subject and method of investigation lies with the head of a laboratory or hospital in respect of some individual worker, or with the worker himself. The success of the application depends upon the merits of the individual and the subject of research. The Council do not provide money for institutions but for individuals, because they regard it as essential that they should retain direct control over the choice of the worker and the type of investigation proposed.

As to whether the Council encourage the direct study of disease or of the more fundamental sciences, the general answer is that they welcome both kinds of investigation. At the same time they recognize that at present there is a relatively great dearth of work in clinical science and in experimental pathology in this country, as compared with many other branches of medical science. So impressed indeed are they by this state of affairs that they are making special efforts to enlarge the available personnel by offering scholarships and fellowships to enable young men and women to enter these particular fields of inquiry. In addition, they have set up special posts, and they are prepared, as opportunity offers, to establish more units for clinical investigation.

So far, then, as initiation of medical research is concerned, the Council's objectives are mainly of long distant and comprehensive type. They send fleets out in several directions and in different seas, hoping that individuals will seize any special prize of discovery that shows itself in any quarter. In the course of such research any good opportunity that offers itself in the form of an *ad hoc* problem is taken, and work may

thus be expressly directed to the solution of specific questions.

TROPICAL MEDICAL RESEARCH IN THE COLONIAL EMPIRE

This activity of the Council was discussed at length in the Annual Report for 1935-36. It resulted from the desire of the Colonial Office that the Council should extend their research interests to problems of tropical medicine, and no invitation has been accepted with greater pleasure. It clearly offered opportunities for discovery, almost unequalled in any other field. On the one hand, any discoveries made would almost certainly be of great practical consequence and might assist in raising the standard of health in countries for which Great Britain has a special duty and responsibility; on the other hand, some diseases in the tropics, such as pneumonia and tuberculosis, are also common in this country, and there was the probability that the simpler conditions of life might allow easier investigation than here.

One of the difficulties to be overcome in accepting this request was the dearth of investigators trained to study tropical diseases, and, as previously explained, the Council devised a scheme of junior and senior fellowships to encourage promising young workers to enter this field and undergo special education and training. In the three years since the scheme was initiated, eight junior and three senior fellowships have been awarded. Fully trained investigators have been sent to the Gambia, Uganda and Tanganyika Territory, to study the action of chemotherapeutic drugs on sleeping sickness, the natural history of yaws, and other problems.

NUTRITIONAL PROBLEMS IN THE COLONIES

In the past year a different kind of opportunity arose for assisting the Colonial Office, as the result of the world-wide interest in nutritional problems. In 1936 the Secretary of State for the Colonies sent out a circular despatch drawing the attention of Governors of colonial territories within the Empire to modern aspects of nutrition and their relation to health, and asking for their comments and advice on such matters as they affected each territory. The response was surprisingly great and resulted in the setting up of an Advisory Committee on Nutrition in the Colonial Empire upon which the Medical Research Council were represented. Many of the replies received from Governors of colonial territories, while showing the greatest interest in the subject and realization of its importance, also made it clear that much more information of the actual dietetic and nutritional problems to be faced in each territory was needed, and that this information could be obtained only by further investigation. To meet this situation, the Advisory Committee on Nutrition set up a sub-committee, with Sir Edward Mellanby as Chairman, to prepare a co-ordinated plan of field surveys and research which might with advantage be carried out with regard to nutrition in the Colonial Empire.

After reviewing the situation, the sub-committee made the recommendation to the Secretary of State for the Colonies that the Medical Research Council should be asked to appoint, for a period of five years in the first instance, a small staff whose duty would be to undertake the scientific co-ordination of a series of field surveys of diet in relation to health and physique in the colonial territories. It was also recommended that the actual field surveys should be made by officers seconded from the colonial service in each territory concerned, and that the main duty of the staff appointed by the Council should be to co-ordinate the inquiries, to ensure the adoption of comparable methods and standards in the different territories and the uniform interpretation of the complete results. These suggestions were approved by the Secretary of State, and the Council willingly agreed to accept the responsibility entrusted to them. It was arranged that the salaries of the staff appointed by the Council for co-ordinating the programme of work should be paid by the Council, while other expenses should be borne by the Colonial Development Fund.

[This closely printed volume of over 200 pages is so packed with information on the innumerable activities of the Medical Research Council that it is quite impossible to give an adequate review of the matter it contains, in the space at our disposal; even a bare list of the researches would take up almost too much room. We therefore have been compelled to abstract freely from the introduction to the report, and strongly recommend all medical research workers to consult the original.—EDITOR, I. M. G.]

ANNUAL REPORTS AND STATISTICS OF THE GOVERNMENT GENERAL HOSPITAL AND THE BARNARD INSTITUTE OF RADIOLOGY, MADRAS, FOR THE YEAR 1937

CLINICAL REPORT BY LIEUT.-COL. G. R. McROBERT, I.M.S.

DURING the year ten cases of chronic endemic fluorine intoxication were admitted from Nellore district and the clinical findings were incorporated in a paper published in the *Indian Journal of Medical Research*.

Problems in anaemia engaged much of the time of the staff, and researches were conducted on the occurrence of achlorhydria in both megalocytic and microcytic forms of anaemia. Achlorhydria with lack of histamine response was found in cases of pure microcytic anaemia as well as in the megalocytic forms.

Koilonychia was noted in microcytic achlorhydric cases even in males (Witt's anaemia).

The great value of iron in the treatment of microcytic anaemia, even in the presence of large numbers of ankylostomes and of achlorhydria, was demonstrated to successive batches of students.

Megalocytic anaemia in both male and female with all the laboratory findings commonly present in Addisonian pernicious anaemia (achylia gastrica with no histamine response, positive indirect van den Bergh reaction) were treated successfully with marmite and iron, and no case which failed to respond to marmite and iron subsequently responded to liver.

In the past three years no case of true pernicious anaemia has been found.

A small investigation on the effect of anaemia on the size of the heart was carried out, and the great dilatation of the heart in severe ankylostome anaemia, with prompt improvement with iron administration, was demonstrated.

CLINICAL REPORT BY DR. P. S. VARADARAJAN

The subject of filariasis as approached by the clinician appears to present some very interesting facts, such as—

(a) The symptoms are not merely confined to the obstructive phenomena nor even to the hypothetical streptococci, thought to play an important rôle in the symptomatology of the disease. On the other hand, the protean nature of the signs and symptoms lead one to look for the cause elsewhere.

The possibility of the extrusion of a toxin attributable to the microfilaria either in its genesis or in its lysis has to be considered, as some of the symptoms appear to be allergic in nature.

(b) The disease appears to be very much on the increase.

(c) Elephantoid conditions are getting rarer.

A select group of cases of myocarditis that have eluded classification was studied.

As there has been no reference to this type of cases in any of the available medical literature, a brief description is permissible. The basis of these cases is certainly nutritional, but the deficiency which is mainly exogenous produces a clinical picture quite unlike that of beri-beri. The central theme is that of a gradually deteriorating myocardium as evinced by the functional deterioration of the heart to the exclusion of any involvement of the other systems. The cases present the symptoms of a non-congestive left ventricular failure and congestive failure is significantly absent at least in the early stages. The artisan rather than the labourer is afflicted. Poor food (in caloric value) is more often the cause than too little food.

Correspondence

TWO CASES OF P. U. O. IN CHILDREN

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I had two cases of P. U. O. in children this summer. One child is one year four months old and another child is four months old. Both children ran an irregular temperature. The temperature in the axilla would be between 99 to 100.4. The pyrexial period lasts a day or two followed again by an apyrexial period of a day or two. Constipation was corrected by regular administration of hydrargyrum cum creta and pulvis rhei co. powders. Quinine had no effect in controlling the temperature. I could not examine their urines for, in spite of the best efforts of the parents, urines could not be saved for the examination; but a course of hexamine to sterilize the children's urine had no effect on the pyrexia. No worms were passed after santonin treatment. Typhoid fever was a possibility, but it was said to be so rare below 5 years of age. I could not do blood tests to eliminate typhoid and paratyphoid fevers. Clinically the children did not show any definite symptoms of these enteric fevers.

The interest in these two cases lies in the fact that the onset of fever corresponds with the hottest part of the summer (Hyderabad), and the fever had gone down as the days became less and less hot, and completely at the onset of rains. Hyderabad had rains on the 5th, and from 1st June the days are less hot than before. The older child was under my treatment from 13th May to 1st June, and the younger child from 16th May to 3rd June.

It is known that the thermogenetic centre in children is unstable; and so it is possible that the irregular low pyrexia in the two children reported may be due to the disturbances of thermogenetic centre from the external heat in the summer. Once the external atmosphere has cooled down, the children got better since the centres have regained their balance.

Yours, etc.,

S. VENKATESWARA RAO,
M.B., B.S. (Andhra).

3887C, AKBARJA BAZAAR,
HYDERABAD-DECCAN,
7th June, 1939.

THE EPIDEMIOLOGY OF CHOLERA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In the research section of the last annual report of the All-India Institute of Hygiene and Public Health, a method of forecasting cholera epidemics is referred to which depends on working out the regression equations connecting the mortality in certain weeks of the year with the total mortality of the preceding year.

The method is stated to be accurate for endemic areas.

The Asansol Mining Settlement, Bengal, is such an endemic area.

In this connection I desire to draw attention to the strikingly constant relation which appears to exist in the Asansol Mining Settlement between the number of deaths from cholera during certain weeks of the year (if the disease is not at the time generally epidemic in the province of Bengal) and the total number of deaths from cholera in the mining settlement during the same year.

From the accompanying table extracted from the Annual Reports of the Asansol Mines Board of Health for the years 1918-28, it will be seen that the mortality from cholera in the mining settlement during the month of March in any year in which the disease is not epidemic throughout the province very constantly

amounts to one-thirteenth of the total annual mortality.

As will be seen from the table, in years such as 1919, 1924 and 1926, when cholera was epidemic throughout the province, the proportion of the March mortality to the total annual mortality in the mining settlement was considerably greater than this, rising to one-eighth (and in 1919 to almost one-fifth) of the total annual mortality. The exceptionally low ratio (1:25) of the March mortality to the total annual mortality in the year 1921, will be seen from a study of the annual report of that year to have been due to the numerous deaths in the month of May of cholera-infected tea-garden coolies on their way homewards through the mining settlement from Assam.

As this very constant and striking relationship exists in the Asansol Mining Settlement between the March and total annual mortalities from cholera, a similar relationship will doubtless be found, on careful investigation, to exist also in other endemic areas between the total annual mortality from cholera and that of some particular period of the year. It is to be noted, however, that the great majority of cases of cholera in the Asansol Mining Settlement for the period under review (with the exception of the year 1921) are stated to have been autochthonous and not due to contact. The cause of this relationship is obscure, but the phenomenon would appear to be a 'vital' one, and not merely coincidental.

TABLE

Year	Number of deaths from cholera during the month of March	Total number of deaths from cholera during the year	Ratio of figures in column A to those in column B
	A	B	
1918	18	225	1:13
1919	346	1,901	1:5.5
1920	13	170	1:13
1921	25	617	1:25
1922	15	169	1:11
1923	14	183	1:13
1924	41	317	1:8
1925	7	89	1:13
1926	74	570	1:8
1927	9	120	1:13
1928	8	105	1:13

Yours, etc.,

J. WALKER TOMB, O.B.E.,
M.D., D.P.H.

C/O STANDARD BANK OF
SOUTH AFRICA,
CAPE TOWN,
9th May, 1939.

[Note.—The period on which the whole argument is based is too small to allow definite conclusions, and, since data should be available for the last 10 years, there is no justification for omitting these. All one can say is that a *prima facie* case has been made out which may or may not prove to be true.

A point for consideration is whether the facts presented here are of any practical importance. If there was an even distribution throughout the year, 1/12th of the cases would occur in March; this is not very different from 1/13th. Do happenings in March give us warning of coming events more than do those of other months? Are these warnings obtained sufficiently early to be of practical value? These are the questions in whose answers the Public Health administration would be interested. No attempt has been made to answer these questions.—EDITOR, I. M. G.]

ANOMALIES IN THE MORPHOLOGY OF *P. VIVAX*

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—The article by Dr. B. M. Das Gupta, published in your May number, described abnormal forms of *P. vivax* in a new-born child, recalls a case we have recently seen in which similar abnormal parasites were found under somewhat similar circumstances. The occurrence is perhaps sufficiently unusual to justify a short note of the clinical and parasitological details.

An Indian child born on a malarious plantation in Selangor, one of the Federated Malay States, developed malaria on 5th March, 1939, sixteen days after birth. The mother had had *P. vivax* malaria two months before the birth of the child but had not had fever during delivery. There was active mosquito transmission on the plantation at the time and it is not unlikely that the infection was acquired after birth. Thin films sent to this laboratory by the courtesy of Dr. J. F. Mitchell, the estate medical officer, showed a malarial infection with a parasite generally resembling *P. vivax* but with differences from the normal morphology which were almost identical with those described by Das Gupta.

The infection was very heavy—more than 1,000 parasites per 100 leucocytes—and all stages of asexual development were present. The infected cells were heavily stippled with typical Schüffner's dots and normally enlarged. Many of them were fimbriated in the manner described by Das Gupta (plate X, figures 7 and 9). The ring forms were of normal appearance but there was a marked tendency to multiple infection of cells. The incidence of single to double and triple infection in 250 infected cells counted was 100 : 25 : 6; the incidence in normal *P. vivax* infection of similar severity, chosen at random, was 100 : 2 : 0. Three parasites in a single cell were seen in several fields containing no other ring forms. The most striking variation, however, from the usual morphology of *P. vivax* was the small size of the mature schizonts and the reduced number of merozoites. Most of the fully-segmented parasites occupied no more than about 2/3rds of the host cell, though a few were of normal size. The merozoite count in 100 schizonts apparently fully-segmented is tabulated below and compared with that from a normal *P. vivax* infection taken at random.

Number of merozoites	Schizonts (present case)	Schizonts (<i>P. vivax</i>)
6	3	0
7	2	0
8	10	0
9	15	0
10	21	0
11	16	0
12	15	4
13	10	3
14	5	14
15	3	15
16	0	30
17	0	13
18	0	12
19	0	5
20	0	3
20 +	0	1
TOTAL	100	100

It will be seen that in the case described the usual number of merozoites was from 8 to 13 and in the *P. vivax* control from 14 to 18.

The gametocytes were indistinguishable in size and appearance from those of *P. vivax*.

There was a recurrence of fever, and parasites were again found in the blood, on 15th June, 1939, three

months later. There were now present only young trophozoites and gametocytes which could not be distinguished from *P. vivax*. No schizonts could be found and, as early quinine treatment was essential on clinical grounds, there was little chance of ascertaining whether the abnormal forms found in the primary attack had reverted to type.

This case clearly has a close clinical and parasitological resemblance to that recorded by Das Gupta. In both cases the infection was heavy and occurred soon after birth. The morphological deviation of the two parasites from normal *P. vivax* was the same. The suggestion arises that this deviation may possibly be related to the growth of the parasite in an infant host.

There is intense *P. vivax* malaria on the plantation from which this child acquired the infection and it may be possible in the future to get further evidence on this point.

Yours, etc.,
JOHN W. FIELD,
and

J. C. NIVEN,
Malaria Research Division,
Institute for Medical Research,
Federated Malay States.

KUALA LUMPUR,
5th July, 1939.

Service Notes

APPOINTMENTS AND TRANSFERS

COLONEL W. E. R. WILLIAMS, O.B.E., to be K. H. S. Dated 17th December, 1938.

Colonel A. C. Munro to be V. H. S. Dated 15th May, 1939.

Colonel D. F. Murphy, M.C., to be A. D. M. S., Deccan District. Dated 21st June, 1939.

Colonel C. A. Wood, M.C., to be A. D. M. S., Kohat District. Dated 21st June, 1939.

Lieutenant-Colonel H. S. G. Haji, M.C., to be O. C., I. M. H., Secunderabad. Dated 21st June, 1939.

Lieutenant-Colonel D. R. Thapar to be O. C., No. 1 Coy., I. H. C., Rawalpindi. Dated 15th June, 1939.

Lieutenant-Colonel V. N. Agate to be O. C., I. M. H., Lahore. Dated 15th June, 1939.

On completion of his training at the Chemical Warfare School, India, Belgaum, Lieutenant-Colonel D. R. Thomas, O.B.E., resumed charge of the office of Chemical Examiner to Government of the Punjab on the 15th June, 1939.

Lieutenant-Colonel S. C. Alagappan to act as District Medical Officer, East Godavari, and Superintendent, Government Headquarters Hospital, Cocanada, with effect from the date of taking charge.

Major J. A. W. Ebdon, Principal and Professor of Surgery, Medical College, and Specialist in Surgery, King George Hospital, Vizagapatam, is appointed Chief Medical Officer and Civil Surgeon, Delhi, with effect from the forenoon of 22nd May, 1939.

Major G. F. Taylor, Professor of Clinical Medicine, K. E. Medical College, Lahore, has been appointed to officiate as Civil Surgeon, Lahore, in addition to his own duties, with effect from the 9th June, 1939, *vice* Lieutenant-Colonel W. Ross-Stewart, C.I.E., proceeded on leave.

Major T. C. Ramchandani to be Specialist in Surgery, Bombay. Dated 12th June, 1939.

Major Assa Singh joined the I. M. H., Lucknow, for duty, on transfer from the Medical Store Depot, Calcutta, on 24th June, 1939.

Captain M. Sendak is appointed as Senior Medical Officer, Port Blair, with effect from the date on which he assumes charge of his duties from Major B. Chaudhuri.

The Secretary of State for India has appointed to the Civil Branch of the Indian Medical Service the undermentioned officers of the Indian Medical Service with effect from the 1st April, 1937. These officers will count their seniority in civil employment with effect from the dates noted against their names, being the dates on which they joined civil employment:—

Lieutenant-Colonel S. C. Alagappan. Dated 20th February, 1937.

Major F. M. Collins. Dated 30th October, 1934.

Major P. V. Karamchandani. Dated 29th September, 1936.

Major S. T. Davies. Dated 7th December, 1936.

Major Lakshman Dass. Dated 30th January, 1937.

Major E. M. Sewell. Dated 28th October, 1937.

The Secretary of State for India has appointed to the Civil Branch of the Indian Medical Service the following officers of the Indian Medical Service with effect from the dates stated against their names:—

Captain J. S. McMillan. Dated 15th November, 1934.

Captain R. L. Haviland Minchin. Dated 30th April, 1936.

Captain F. A. B. Sheppard. Dated 3rd September, 1936.

Captain J. Edis-Myers. Dated 1st July, 1937.

Captain W. Happer. Dated 24th December, 1937.

Captain D. W. Taylor was transferred to civil employment in the Punjab. Dated 1st June, 1939.

Captain D. W. Taylor on completion of special duty at the Mayo Hospital, Lahore, assumed charge of the Office of Civil Surgeon, Sargodha, in June 1939.

Captain T. Sommerville was transferred to civil employment to the Pasteur Institute of South India, Coonoor. Dated 1st June, 1939.

Captain H. B. Wright has been granted a permanent commission in the I. M. S. from 7th June, 1939.

His Excellency the Governor of Bengal is pleased to appoint Captain P. I. Franks to be Surgeon on His Excellency's personal staff, with effect from the 12th June, 1939.

Captain J. W. D. Goodall made over charge of the Midnapore Central Jail to Major S. Annaswami, on the forenoon of the 20th June, 1939.

Captain S. P. Bhatia took over charge of the Medical Store Depôt, Calcutta, on 20th June, 1939.

The undermentioned appointments have been made:—

To be Captains (on probation)

Amarendra Krishna Dev. Dated 31st May, 1939, with seniority from 31st May, 1935.

Mohammad Akram. Dated 2nd June, 1939, with seniority from 2nd June, 1935.

Datla Satyanarayana Raju. Dated 4th June, 1939, with seniority from 4th June, 1935.

Monohar Singh Chadha. Dated 19th June, 1939, with seniority from 19th June, 1935.

To be Lieutenants (on probation)

1st May, 1939

Sydney George Nardoll, with seniority, 1st November, 1937.

Kenneth Donaldson Fraser, with seniority, 1st November, 1937.

Derek Hadroll Harrison, with seniority, 1st November, 1937.

William Daniel Pierson Griggs, with seniority, 1st May, 1938.

Gerald Samuel Michelson, with seniority, 1st May, 1938.

Walter McIville McCutcheon, with seniority, 1st May, 1938.

John Aitken, with seniority, 1st May, 1938.

Pierce Kent, with seniority, 1st May, 1938.

Richard Olyffe Yerbury, with seniority, 1st May, 1938.

Douglas Spencer Wilson, with seniority, 1st November, 1938.

The undermentioned officers are restored to the Establishment, 1st May, 1939:—

Lieutenant (on probation) J. P. O'Riordan, with seniority, 1st May, 1938.

Lieutenant (on probation) P. J. Wormald.

The undermentioned officers, on the grant of short service commissions in the I. M. S., reported for preliminary training on the dates and at the hospitals noted opposite their names:—

Lieutenant B. K. Kapur, Rawalpindi Hospital. Dated 22nd June, 1939.

Lieutenant P. C. Dhanda, Rawalpindi Hospital. Dated 6th June, 1939.

Lieutenant H. R. Pasricha, Rawalpindi Hospital. Dated 6th June, 1939.

Lieutenant M. Sarwar, Rawalpindi Hospital. Dated 22nd June, 1939.

Lieutenant M. S. Haque, Rawalpindi Hospital. Dated 24th June, 1939.

Lieutenant P. T. Joseph, Lucknow Hospital. Dated 22nd June, 1939.

Lieutenant K. K. Menon, Lucknow Hospital. Dated 22nd June, 1939.

Lieutenant N. Chakravarti, Lucknow Hospital. Dated 22nd June, 1939.

Lieutenant S. N. Chatterjee, Lucknow Hospital. Dated 22nd June, 1939.

Lieutenant D. K. Bose, Lucknow Hospital. Dated 22nd June, 1939.

Releases

Captain B. S. Bindra. Dated 16th June, 1939.

Captain W. A. Mirza. Dated 21st June, 1939.

LEAVE

In modification of previous notification, Lieutenant-Colonel A. D. Loganadan is granted combined leave for 12 months, with effect from the 6th December, 1938.

Lieutenant-Colonel B. Z. Shah, Civil Surgeon, Belgaum, has been granted leave on average pay for 4 months followed by leave on half-average pay for 6 months and 16 days preparatory to retirement, with effect from the forenoon of 20th May, 1939.

Lieutenant-Colonel G. A. Hildreth, O. C., Post Hospital, Dacca, proceeded on 12 months' combined leave *ex-India*, pending retirement, from 1st June, 1939.

Lieutenant-Colonel F. Phelan, O. C., I. M. H., Poona, proceeded on 3 months' combined leave *ex-India* from 3rd June, 1939.

Lieutenant-Colonel W. Ross-Stewart, C.I.E., Civil Surgeon, Lahore, proceeded on leave for 4 months, with effect from the 9th June, 1939.

Lieutenant-Colonel T. S. Shastri, Acting District Medical Officer, Kistna, is granted 12 months' leave, with effect from the 19th June, 1939, or date of relief whichever is later.

Lieutenant-Colonel A. H. Harty, Civil Surgeon and Superintendent, B. J. Medical School, and Mental Hospital, Ahmedabad, has been granted leave *ex-India* on average pay for 2 months and 28 days combined with leave on half-average pay for 1 month and 3 days, with effect from 6th July, 1939.

Major H. T. McWilliams, Staff Captain (Medical), Western Independent District, proceeded on 4 months' combined leave *ex-India*, with effect from 29th May, 1939.

PROMOTIONS

Majors to be Lieutenant-Colonels

S. D. S. Greval. Dated 12th May, 1939.

G. H. Fraser. Dated 25th May, 1939.

Lieutenants (on probation) to be Captains (on probation)

L. E. Elkerton. Dated 28th April, 1939, with seniority from 1st January, 1939.

C. C. Harvey. Dated 24th May, 1939, with seniority from 1st July, 1938.

D. F. Eastcott. Dated 1st July, 1939.

J. A. M. Cameron. Dated 12th May, 1939, with seniority from 1st July, 1938.

R. J. McGill. Dated 12th May, 1939, with seniority from 1st July, 1938.

A. M. Best Dated 12th May, 1939, with seniority from 1st January, 1939.

J. Lightbody Dated 12th May, 1939, with seniority from 1st January, 1939.

H. F. T. MacFetridge Dated 12th May, 1939, with seniority from 1st January, 1939.

The undermentioned short service I. M. S. Officers have been granted permanent commissions as shown below—

Captain A. K. Dev. Permanent commission dated 31st May, 1939, with seniority from 31st May, 1935.

Captain M. Akram Permanent commission dated 2nd June, 1939, with seniority from 2nd June, 1935.

Captain D. S. Raju. Permanent commission dated 4th June, 1939, with seniority from 4th June, 1935.

Captain M. S. Chidha. Permanent commission dated 19th June, 1939, with seniority from 19th June, 1935.

RETIREMENTS

Colonel A. F. Bibonau, C.B., O.B.E., V.D.S. Dated 21st June, 1939.

Colonel W. L. Wilson, O.B.E. Dated 21st June, 1939.

Lieutenant-Colonel M. J. Holgate, O.B.E. Dated 15th May, 1939.

Lieutenant-Colonel K. G. Pandhar Dated 20th May, 1939.

Notes

PROSEPTASINE/SOLUSEPTASINE

ALTHOUGH M & B 693 is the product of choice in gonococcal, pneumococcal, meningococcal and staphylococcal infections, Proseptasine and Soluseptasine have a wide field of use for the treatment of those infections occasioned by the presence of the *Streptococcus hemolyticus* or the *B. coli*.

Proseptasine has been available for three years, and its use throughout that period has steadily increased. It is now generally accepted that Proseptasine is much less toxic than sulphanilamide, and it is interesting to note in the 8th April issue of the *B. M. J.*, it is stated that 'The comparative lack of toxicity of Proseptasine, even when administered to very young children, has been fully borne out'. Soluseptasine, which was introduced subsequently, still finds general favour as the only sulphonamide preparation available for intravenous, intramuscular or intrathecal injection in concentrated aqueous solution.

The present position of both these products is dealt with in a publication, a copy of which we received recently from the manufacturers, Pharmaceutical Specialties (May and Baker), Ltd., entitled 'Proseptasine and Soluseptasine for the Chemotherapy of Streptococcal Infections'. Copies are available to the medical profession on request, from Messrs May and Baker (India), Ltd., 11, Chive Street, Calcutta.

KAPSEALS DESICOL

(PANKE, DAVIS AND CO.)

AN EFFECTIVE CHOLAGOGUE AND CHOLERETIC

KAPSEALS DESICOL present desiccated bile in a form which is readily soluble and similar to whole fresh bile in therapeutic activity. This product is readily soluble on account of a special process of manufacture whereby whole bile is desiccated without coagulation of the proteins.

Each kapséal represents 2.5 c.c. of fresh gall bladder bile.

Indications

Chronic cholecystitis—This inflammatory disease of the gall bladder wall is frequently associated with cholelithiasis and altered liver function. It is estimated that approximately 50 per cent of all women over 40 years of age who have borne children are afflicted.

In these cases control of constipation is important and amongst other measures of treatment the use of bile salts has been suggested. The use of cholagogic drugs in the treatment of liver and gall bladder disease has always been regarded as a very valuable and logical approach to the medical treatment of these cases.

It is generally believed that gall stones are formed frequently during or after an attack of cholecystitis on account of the reduction in the protective colloids or when bile salt concentration falls below a certain level. Administration of bile salts by mouth may favourably influence the course of events in cholecystitis, thereby minimizing the formation of gall stones.

Liver function is improved by stimulating an increased production of normal bile so that equilibrium may be established between its various constituents.

The usual dose of Kapséals Desicol is two kapséals three times daily with meals. When Desicol is taken on a full stomach the gastric distress which may result from presence of bile in the stomach is obviated.

Desicol is supplied in bottles of 50 sealed and airtight kapséals.

Further information regarding this product may be obtained from Messrs Panke, Davis and Co., P. O. Box 88, Bombay.

'BETAXIN'

BITAXIN IN THE TREATMENT OF LEPROSY

Very promising results are being obtained with 'Betaxin' in many aetologically diverse forms of polyneuritic and polyneuralgic disorders. The neurotoxic and infective types appear to respond equally well. The usual dosage used by different workers was 1 mgm., and the total amount administered over some 9 weeks was 45 mgm. Of late, in the light of further experience, the single dose up to 10 mgm. was reached by some, while others state that the rapid cessation of pain and regression of the nerve swellings was most striking. Even advanced bilateral peroneus paralysis improved in a relatively short time so much that practically complete function could be restored.

In conclusion it should be stated that treatment with 'Betaxin' injections has proved of great service in leprous neuralgia occurring as an isolated symptom and in the course of a general reaction to the disease, the response is equally good in the usually intractable neurotic vaso-dilatatory symptoms in the hands and feet, which as a rule are associated with severe pain and paresthesia. The action appears to be highly selective, since the treatment leaves both the general and the arthritic symptom of leprosy wholly unaffected.

Leprosy Review, X 109,39.

THE VIEW OF THE LEAGUE OF NATIONS

ON MALARIA TREATMENT AND PROPHYLAXIS

(Abstracted from the Fourth General Report of the Malaria Commission)

THE Malaria Commission of the League of Nations regards as its main task to help physicians to distinguish what is clearly proved from what is still doubtful. Moreover, where truth is not plainly revealed, the Commission endeavours to ascertain on its own account, by arranging experiments according to a specific programme, as it has recently done the true value of the procedures or measures advocated.

In this country, the wrong idea is widespread that the Malaria Commission recommends a special way of treatment or a special preparation to be used. The statement 'The short Quinine Treatment as recommended in the Malaria Commission' is frequently met with in newspaper articles. A study of the fourth report, however, reveals that no such 'standard' method of treatment is recommended, as the Commission does not deem it advisable to do so. It is stated in the beginning of the report 'We do not think,

however, that it is part of the Commission to instruct medical practitioners in "standard" methods of treating the disease. However the advantages and disadvantages of every method and of every drug now in use in the fight against malaria are described and much is added to the knowledge about the synthetic drugs 'atebrin' and 'plasmochin' which are well known in this country. The report ends by saying:

'As regards the synthetic products, which have only been used in therapeutics for ten years, the Commission hopes that it has discharged the duty which devolved upon it by giving in this Fourth General Report an account of the present state of our knowledge regarding the possible use of "atebrin" and "plasmochin" in the treatment and prophylaxis of malaria. In certain circumstances, as has been shown above, the drugs—representing a notable scientific advance—possesses a very special value.'

GLUCOSE-D. ANNOUNCEMENT OF PRICE REDUCTION

GLUCOSE therapy is now made more widely available by the 20 per cent reduction recently announced by Glaxo Laboratories Ltd. This welcome step now makes it possible to prescribe the treatment for the patient previously debarred by limited income.

Medicinal glucose is frequently prescribed for a wide range of conditions in which easily assimilable and emerging nourishment in liquid form is required. Modern views on glucose therapy, however, agree that when reinforced with calcium and vitamin D (as in Glucose-D), the treatment becomes even more valuable. It is claimed that while the glucose itself is given for its energy-promoting function, the calcium and vitamin D are necessary in certain conditions to improve neuro-muscular tone of the myocardium and the whole system generally. 'The common cardiac disturbances are intimately related to faulty nutrition of the heart muscle', states Martin in his book *Dextrose Therapy* and he goes on to say further that 'the heart, like skeletal muscle, derives much of its energy for contraction from the break-down of glycogen. Inadequate supply of dextrose to the heart eventually produces deleterious effects upon cardiac action'.

In ketosis, too, the vitamin D plays its part. In this condition, when a low fat diet is often necessary for long periods, the patient is subjected to the risk of fat-soluble-vitamin deficiency. The vitamin D in Glucose-D compensates for this deficiency of the calcium-regulating factor. It is thus possible to keep patients on a low fat diet, without producing symptoms of deranged calcium and phosphorus metabolism.

PHOTOGRAPHS FROM EXPOSURE TO PRINT

Photographs from Exposure to Print is the title of a new Burroughs Welleome and Co. booklet. The cover constitutes a novel wallet in which prints may be accommodated.

The various stages in the making of a photograph are explained fully but simply so as to be understood by the veriest beginner. The value of those well-known aids to the amateur photographer, the 'Welleome' exposure calculator and 'Tabloid' photographic chemicals, is amply demonstrated. Readers of this journal will receive a copy free and post free on request from the publishers, Burroughs Welleome and Co., Snow Hill Buildings, London, E.C.1.

VOLPAR PASTE

VOLPAR PASTE is prepared for use in conjunction with rubber cap pessaries. It is intended to be smeared on the rim of the pessary before the latter is placed in position over the mouth of the uterus. Volpar paste contains the same active ingredient as Volpar gels

and the production of these two preparations is the outcome of nearly ten years' continuous investigation conducted by university research workers under the direction of the Birth Control Investigation Committee. During the latter half of this time the work was carried out in association with the scientific staff of The British Drug Houses Ltd. The active constituent of Volpar paste has been shown by laboratory tests to be the most powerful non-toxic spermicide known.

It is essential that rubber caps should be well fitted and never used alone. Volpar paste should always be used with every type of rubber cap in order to seal up the minute openings which will otherwise occur between the cap and the tissues. Such openings, although minute, are still large enough to allow of the free passage of living sperms. It is customary for the physician to advise that either twelve hours should elapse after use or that a douche should be used before the cap is removed. When extreme safety is required a Volpar gel may also be employed. This is frequently considered unnecessary. The ingredients used in the manufacture of Volpar paste are absolutely harmless, but in order to comply with the new poisons rules it is necessary to include the word 'poison' on the label. This is due to the presence of a minute quantity of mercury which is, however, so combined that it is quite harmless and any misgivings on this account may be confidently dismissed.

Readers are referred to p. 243 in our April issue, where an abstract was given of a paper published in the *Lancet*, describing the experimental work with this preparation.

Publishers' Notice

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles are entitled to receive 25 reprints *gratis*; additional reprints can be obtained on payment. No reprints will be supplied unless contributors ask for them at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions and Advertisements should be addressed to THE PUBLISHERS, *The Indian Medical Gazette*, P. O. Box No. 54, Calcutta.

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The Editors of *The Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

Original Articles

THE TUBERCULOSIS OF TROPICAL COUNTRIES

(PRIMITIVE TUBERCULOSIS AND THE PARTIALLY MODIFIED DISEASE)

By S. LYLE CUMMINS, C.B., C.M.G., M.D., LL.D.
COLONEL, A.M.S. (ret'd.)

Late David Davies Professor of Tuberculosis, National University of Wales

'WHEN a race previously free from tuberculosis is brought into contact with the germ for the first time, the people will tend to get the disease in an acute and rapidly-fatal form, quite unlike the well-resisted illness recognized as tuberculosis amongst more sophisticated races'.

Such was the theory enunciated by Calmette (1921), Deycke (1914), Borrel (1920), the author (Cummins, 1912) and a host of others some twenty or thirty years ago. This theory has been criticized in several ways and by various men, notably by Bezançon and Arnould (1937), who hold that 'tuberculosis is not really frequent or often serious amongst negroes, except amongst those who change their surroundings or conditions of life, quite apart from the state of allergy or non-allergy of these subjects'. It is the object of this paper to show that, while much may be said against it, the theory of 'primitive tuberculosis' remains as true now as when it was first enunciated.

As to the statement of Bezançon and Arnould, however, that the disease is only very severe and frequent when men move away from their familiar surroundings or change their way of life, a great deal may be said in its favour.

There is no doubt that many cases of chronic tuberculosis are found to occur amongst people who have never left their native surroundings though their relations, going to the mines or other industries, tend to go down with a terrible and malignant type of tuberculosis. Cases of this kind have been reported by Allan (1932), who found, for instance, a woman whom he had seen as a case three years before, still alive and still suffering from tuberculosis though her children did not appear to be ill! This was in the Transkei, a place from which men go to the mines at Johannesburg and where many contract a rapid and fulminating type of fatal tuberculosis. Kleine (1930), too, has described the case of an elderly married but childless woman with pulmonary tuberculosis and a positive sputum who had suffered from the disease for about three years. She was one of five cases discovered out of 9,000 examined at Sikonge in Tanganyika.

It is, then, true or partly true that the disease may proceed quite slowly in primitive peoples

under the restful conditions of their village life, but it would be a great mistake to say that it always does so. For those in intimate contact with a heavily infected person, as, for instance, a man returning sick after a period on the mines, the situation must often be quite different. Macvicar told me of cases of tuberculosis in families which were very severe and numerous, and many such cases have come to my notice from time to time. Still it must be freely admitted that a great many cases are of a chronic type in the villages and that they present a sharp contrast, in this respect, to their brothers or husbands at the mines. I would postulate for this condition a kind of chronicity quite different from the chronic phthisis of Western Europe, a kind of chronicity that would very soon break down into acuteness if the subject were exposed to the least stress. There is a chronic phthisis of guinea-pigs artificially infected with very small doses, and I think that these cases must be very like guinea-pigs in this way; contracting the disease from very small beginnings and having the time, therefore, to elaborate some kind of defence against it. We know, indeed, that very minute doses of infection lead to glandular enlargement without disease in a great many of the men from these villages, as is proved by their arriving at the mines with something like eighty per cent showing a 'positive' to the Mantoux test, and it must therefore be supposed that many are so infected as to get chronic disease also.

'Arriving at the mines with something like 80 per cent positive'. Surely such men are no longer primitive in the sense of not being resistant to the germ! There, I think, we have the whole explanation. The people of the Transkei are *not* primitive in that sense any longer although they were so some 100 years ago. And yet, although the people remaining in their villages sometimes get a more-or-less chronic form of phthisis, those who go to the mines are liable to a terribly acute type. The reason is that these people are only very slightly immunized though extremely sensitive to tuberculin.

The real 'primitive' tribe must now be very rare, if existing at all. Forty or fifty years ago the true primitive may have been comparatively common but with the conquest of the air and other advances he is rapidly being converted into a historic figure—and he may even become *legendary*, if inaccurate writers take up the question in the future. Bezançon and Arnould, although they have seen very clearly the gradual nature of tuberculosis when people remain sedentary and restful, are mistaken in saying that their state remains the same 'quite apart from the state of allergy or non-allergy of these subjects'. It is in their high state of allergy that the danger lies because their state is to all intents and purposes, without any corresponding immunity and their allergy is very much higher in its titre than the allergy of Europe or America.

This was made plain in South Africa during the work of the Commission where the reactions recorded to 1/100,000 of 'old' tuberculin were 55 per cent, to 1/1 million, 51 per cent and to 1/10 million, 48.6 per cent. It will be noticed that the figure was almost exactly the same, even in the highest dilution used. There was immense sensitivity. And yet the immunity was absent or very slight, especially in just those 'boys' that were most sensitive. Of those 'boys' recorded as reacting very positively to 1/5,000 and 1/10,000, and marked as 'PP' or, in other words, vesicating as a result of their tuberculin, the rate of incidence within a year of testing was 1,578 per 100,000. Amongst the 'negatives' the rate of incidence was only 405 per 100,000. But it is to be remarked that the 'negatives' were only negative to 1/5,000 and 1/10,000 and that there were probably many positives, of a less sensitive kind, amongst them. The true negatives were probably very liable to acute tuberculosis, in fact they furnished nearly all the more generalized cases, but the low positives amongst them clearly were much more immune than the high positives. We are, thus, led to the belief that these people, though so very sensitive to tuberculin, are much more liable to tuberculosis than persons of European stock.

Africa is a large continent and it is not to be expected that things should be the same throughout its great extent. There are some races very nearly 'primitive' and some, the majority, very much in the intermediate stage which I have described for the people of the Transkei.

When we turn to the pathological portion of the South African report, we appreciate at once that we are very close to the type of disease which was described by Borrel in the Senegalese soldiers brought to France during the Great War. And yet there are certain differences, when one comes to examine carefully the two series in comparison with one another. The type in South Africa may be appreciated from the following table :—

Lungs and pleura

Acute caseating tuberculosis	70
Acute caseating tuberculosis with excavation ..	102
Miliary tuberculosis only	53
No tuberculosis in lungs (pleura or mediastinum affected)	16
	—
	241

On the other hand, the 'Borrel' gland, described as nearly always to be found above the clavicle was not at all common in South Africa, at least as far as the pathologists were able to make out. Another difference was in the time of appearance of the tuberculosis. Borrel did not see many cases until a year or more had elapsed. The South African cases broke down early, the great majority in three or six months after starting work. That this is a striking character of the recruits now going forward to

the mines will be admitted when it is recalled that the negroes called up from the central and coastal parts of Africa previous to 1912, a much less immune community than the men now recruited from the Transkei and Ciskei or from Portuguese East Africa, went down with tuberculosis so long after their exposure on the mines as 271 days or some cases, from a year to two years, like Borrel's Senegalese. This retardation of disease and death looks like primitive tuberculosis. To find a stage still further advanced than the modern African we may turn to the American negroes who have at least eight or ten generations of association with Europeans to record and who are now only about two generations behind the white man from the point of view of mortality from the disease.

Bushnell (1920) pointed out that these negroes, at the time of the Civil War, had not a much greater death rate than the whites. After that war, the black races of America, previously enslaved, were given their liberty and, at the same time, became responsible for their own lives. Until then, they had had at least a master to whom they could look for shelter and subsistence if not for more, and they had enjoyed the life of agriculturists widely scattered through a rich country with no over-crowding and a fair average of health. With their liberty they became possessed of the right to obtain their own living as best they could and yet had to do so in the presence of a rigid colour bar which kept them in subordinate positions. And there is no doubt that they were also lazy and easy-going in comparison to the pushing citizens of the United States. It is not to be wondered at that they developed a marked amount of tuberculosis; but there has always been a peculiar *character* which has served to distinguish their lesions from those of the white men amongst whom they compete for a living. Louis Dublin (1920), writing on this subject, spoke as follows :—'Tuberculosis of the lungs is the most important cause of death among coloured people. The death rate is more than twice as high among insured negroes as among white policy holders. The disease is a veritable scourge among young negroes. At the ages between 10 and 14 years, the tuberculosis death rate among coloured boys is eleven times as high as it is among white boys of the same age. Coloured girls at the same age period show a death rate eight times greater than white girls'. Opie (1924) speaking of the differences in type of lesion, says :—

'Focal tuberculosis which has its origin in childhood is less prevalent and less advanced in coloured than in white adults. Chronic apical tuberculosis and latent apical tuberculosis are less frequent in the coloured than in the white adult, and when pulmonary tuberculosis occurs in the negro adult it has more frequently than in the white the characters of a first infection. Tuberculous lesions, such as acute miliary tuberculosis and tuberculosis of lymph nodes, which

are often found in white children, occur more frequently in coloured than in white adults. The American negroes are less thoroughly tuberculized than the white race'.

Max Pinner and Joseph A. Kasper (1932) deal with the tuberculosis of the negro as compared to the white and make the following statement:—'Certain significant differences between the two races are shown to exist.

(a) Greater frequency of miliary tuberculosis in the negro (37.3 per cent) than in the white (15.5 per cent).

(b) Greater frequency of hæmatogenous metastases in the negro (84.2 per cent) than in the white (40.0 per cent).

(c) Greater frequency of lymphatic metastases in the negro (66.8 per cent) than in the white (10.8 per cent).

(d) Various qualitative differences in the pattern of tuberculous lesions in the two races'.

They give the most characteristic features of adult negro tuberculosis as:—

Massive lymph-node caseation.

Massive exudative lesions which do not respect the normal boundaries of organs.

A type of generalized tuberculosis without the formation of miliary tubercles but with irregularly scattered nodular foci. These quotations will serve to illustrate what is known about the tuberculosis of the negro in the United States. The disease as it affects the American Indian is also an example of a somewhat earlier 'primitive' tuberculosis becoming, however, modified with the passage of time and the gradual adaptation of the people to their conditions, the available diet of to-day, and the house or shanty as opposed to their old-time teepees.

The Eskimos, too, afford another example of a still earlier type. Suk (1931) describes them as still very free from the disease though becoming infected. 'About thirty years ago', he says, 'Lieutenant Peary brought six Smith's Sound Eskimos to New York; within one or two years four of them were dead. They succumbed to acute tuberculosis'.

Many more quotations might be extracted but these will suffice to show that, like the continent of Africa, America can also produce a great variety of more-or-less modified but still essentially 'primitive' cases of tuberculosis.

It was recently my lot to visit Burma and to study the tuberculosis problem there. I found that the Burmans were suffering from a high death rate, higher than the Indians residing in Burma, and I was able to show that, even in the parts of Upper Burma visited, this high death rate persisted, although the tuberculin index was relatively low, a finding which suggests very strongly that death must be rapid when the disease is contracted. In Rangoon, where the tuberculin index was just as high as in England, the deaths were four times as high, a proof that the population of Rangoon is very susceptible to the disease. The conditions found in Burma convinced me that, apart from

the larger towns, the disease is a relatively new one to the population. I venture to quote one or two of the series of 9,000 von Pirquet tuberculin tests carried out by me to illustrate my meaning:—

Per cent positive von Pirquet tests

	—10 years	—15	—20	Over 20
Upper Burma—				
Mandalay ..	3	14	23	31
Shwebo ..	4	..	7	22.8
Maymyo ..	3.7	4	..	40
Lower Burma—				
Akyab ..	9	16	27	38
Moulmein ..	11	19	26	39
Bassein ..	9	12	26	34
Rangoon ..	26	43	49	61

In Rangoon, things were different. Here, for many years, a large mixed population has striven to exist, often very badly housed and fed, and the handing round of the infection is very common, just as common as in London.

It is to be recalled, however, that in Rangoon the mortality, as far as one is in a position to judge it, is more than four times that in England and Wales, showing that there must be something to put it up, out of proportion to the amount of infection as judged by the tuberculin test. Apart from the poor living conditions, it seems to me that the susceptibility of the people is very largely to blame and that the disease is a comparatively new one to a great many of the persons exposed.

And surely India must tell the same story. The work of Ukil makes this, to my mind, certain, and the observations of Benjamin are a proof that, apart from the great cities, the people of India are also facing a relatively new disease. It is not to be supposed that, tuberculosis is new to places like Calcutta and Bombay. There must be many cities which have paid their tribute to its demands during many generations in the past. But to the essential man of India, the labourer at agriculture or at some pastoral pursuit, it must be, to a great extent, a disease until recently unknown. To quote Frimodt-Møller, 'We have reason to believe, as far as our research goes, that economic, social and hygienic factors, play a far less important part in producing the severe type of pulmonary tuberculosis met with in India than is generally supposed'. The most important part, we believe, is played by a want of acquired resistance.

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A TUBERCULOSIS SURVEY IN A SOUTH INDIAN TOWN

By P. V. BENJAMIN, M.B., B.S. (Madras),
T.D.D. (Wales)

*Medical Superintendent, Union Mission Tuberculosis
Sanatorium, Arogyavaram, near Madanapalle,
South India*

M. C. VERGHESE, M.B., B.S. (Andhra)

K. T. JESUDIAN, M.B., B.S. (Madras)

and

C. E. VARKKEY, M.B., B.S. (Madras)

On the invitation of the Saidapet Health Association, a tuberculosis survey was begun in Saidapet, near Madras, in November 1938 and was carried on to March 1939. It was thought that the number surveyed by this time was sufficient both for preliminary conclusions to be drawn and also to see whether the investigation, if to be continued, should proceed along the same general lines, or whether modifications should be made for investigation into special factors which seemed of interest and importance.

The beginning of the survey was possible without much preparatory work in the town, as the excellent efforts of the Saidapet Health Association had paved the way by its several years of work among the population, which had produced to some extent a health consciousness and a comparatively welcoming attitude. The result was a large amount of co-operation from the general public, to which was added the whole-hearted co-operation of those associated with the Saidapet Health Association.

Saidapet is about six miles from the business centre of Madras, to which it is connected by electric trains and very frequent buses. It has a population of about 33,000, and the basic occupations are hand-loom weaving, hand-dyeing, pottery-making, *jutka*-making and repairs, gold-smithing and *dhobying*, although some of these occupations have in recent years been hard hit by modern developments. In general, it may be said that Saidapet is a typical south Indian town in its economic, social, hygienic and religious customs and methods of living.

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Nature and method of the survey

An attempt was made to include every individual in each area surveyed, and, in the investigation so far carried out, certain areas were selected to give as far as possible a fair sample of the various communities, economic, social and living conditions found in the whole town.

In the area surveyed, a little over half of the whole population of the area was seen, 553 out of 1,023 houses, and in the houses visited almost always all members of the 900 families living there were included in the investigation.

The survey included the Mantoux test, physical and x-ray examinations of those strongly positive, and those with symptoms and, where possible, sputum examination. An investigation was also made into the family regarding social status, house condition, medical history, including history of contact with tuberculosis, and diet. The information was collected by personal visitation, very often repeated several times by the doctors and health association staff. For convenience of classification, the details for all individuals were entered from the permanent records onto cards.

Technique and Mantoux test

In the beginning of the survey, an injection of 1/10 c.c.m. of 1/1,000 (Burroughs Wellcome & Co.) old tuberculin (human) was made, with an intradermal needle, into the flexor surface of the skin of the forearm, after previous cleansing. If any individual showed symptoms suggesting tuberculosis, a strength of 1/10,000 tuberculin was used. If this first injection was negative, the test was repeated, using 1/100 tuberculin. But owing to the difficulty of persuading people to have a second injection, this method had to be abandoned, and instead one injection of 1/500 dilution of tuberculin was used for the general survey, and 1/10,000, as before, for suspected individuals.

The reading of the test was done 48 hours after the injection, and in a few cases 72 hours after, and readings were noted according to six classifications, negative, \pm a reaction of below 5 mm. in diameter, + a reaction of from 0.5 to 1 cm., ++ of from 1 cm. to 1.5 cm., +++ above 1.5 cm., ++++ when there was vesication or necrosis associated with strong induration.

All injections and readings were done by doctors experienced in the test.

Physical and x-ray examinations

Physical examination was done in all with suspicious symptoms or all with strongly positive tuberculin reactions, even without any symptoms, except for a few who refused examination.

X-ray photos were taken of approximately only one-third of those physically examined, as the survey party did not have an x-ray outfit at its disposal, and it was possible to get about 20 photos only, taken once a week. We are

indebted to the Barnard Institute of Radiology, Madras, for their willing co-operation in this respect, which involved considerable extra work for them.

Findings in the survey

The investigation covered in all 3,309 individuals, 3,124 in Saidapet municipal area, and 185 in an adjoining *cheri* in Mambalam. For this last group full details regarding family, social condition and so on were not collected. The 3,124 individuals in Saidapet were in 900 families living in 23 streets in different parts of the town. There are not included 75 persons in whom the skin test was not read, and 36 who refused to have the stronger dilution but who were negative with 1/1,000 dilution.

(a) Extent of tuberculous infection

(i) *General*.—Of the 3,309 persons examined, 1,924 or 58.1 per cent showed a positive reaction, namely, 1,234 or 37.3 per cent +, 237 or 7.2 per cent ++, 386 or 11.7 per cent +++, and 67 or 2.0 per cent ++++; 1,009 or 30.5 per cent showed a completely negative reaction, and 376 or 11.4 per cent showed a ± or doubtful reaction.

If the 1,924 positives are taken by themselves, it will be seen that 1,234 or 64.1 per cent were +, 237 or 12.3 per cent were ++, 386 or 20.1 per cent were +++, and 67 or 3.5 per cent were ++++.

If the adults and children under 15 are separated, the results may be tabulated as follows:—

infection* were found in no. 21 street with 174 people and 23.6 per cent positives, and no. 7 street with 92 persons and 37 per cent positives.

The details for all the streets are given in tables II (a) and (b).

(iii) *According to sex*.—An examination of the figures was made with regard to sex. The figures for the Mantoux test are given in table III.

(iv) *According to community*.—The great majority of those examined were Hindus, as these form the majority of the population in the town, being about 30,500, out of 33,000; Muslims, according to the latest figures available, number 1,341, and Christians 1,099. Approximately the same proportion was found in the area surveyed. The figures for the Mantoux test are shown in table IV.

(v) *According to occupation*.—The figures for the Mantoux test, as regards different occupations, are shown in table V.

(vi) *According to economic status*.—In the examination of the economic status of the people, they are divided into groups according to income per head in the family, children included.

The Mantoux results for the group are shown in table VI.

While the above table gives the general figures for the whole group, there are considerable variations if the groups are divided according to streets. Taking only adults, to eliminate any variation which might be due to a different proportion of children in each street and omitting percentages of any groups below 10, the figures

TABLE I

Number and percentage of tuberculous infections as shown by the Mantoux test

	Total number	—	±	+	++	+++	++++	Positives
Adults ..	1,963	372 or 19.0 per cent	221 or 11.3 per cent	868 or 44.2 per cent	180 or 9.2 per cent	282 or 14.4 per cent	40 or 2.0 per cent	1,370 or 69.8 per cent
Children ..	1,346	637 or 47.3 per cent	155 or 11.5 per cent	366 or 27.2 per cent	57 or 4.2 per cent	104 or 7.7 per cent	27 or 2.0 per cent	554 or 41.2 per cent
TOTAL ..	3,309	1,009 or 30.5 per cent	376 or 11.3 per cent	1,234 or 37.3 per cent	237 or 7.2 per cent	386 or 11.7 per cent	67 or 2.0 per cent	1,924 or 58.1 per cent

The above table includes all individuals tested, but in the subsequent figures 349 people are omitted, as detailed information was not obtained about them as regards other factors, the figure 349 includes 185 in the *cheri* of Mambalam.

(ii) *According to streets*.—If the extent of tuberculous infection is examined from the point of view of streets, the 23 different streets show variations from 85.2 per cent to 20.0 per cent positive, the highest percentages of infection being found in no. 19 street with 393 people tested, where the positives were 85.2 per cent, no. 14 street with 179 people and 78.2 per cent positives, no. 18 street with 168 people and 73.2 per cent positives; the lowest percentages of

for the different streets are as shown in table VII.

(vii) *According to living space*.—In order to see the effect of crowding on the tuberculosis infection rate, the 2,960 people were grouped according to the amount of living space per head (kitchen and store-room included).

The figures for the whole group are shown in table VIII.

This table may be misleading if no account is taken of a wide difference in type of housing accommodation; for example, in streets nos. 3

* Excluding street no. 17 in which there were only 10 persons examined.

TABLE II (a)

Table showing the result of the Mantoux test in each street (adults, and children 15 years and below)

Number of street	Total number of adults and children	Number of adults (A)	Number of children (C)	Negative		Doubtful		+		++		+++		++++	
				A	C	A	C	A	C	A	C	A	C	A	C
1	51	40	11	10	6	10	1	13	3	3	0	4	1	0	0
2	35	17	18	9	9	1	2	4	5	1	1	2	1	0	0
3	140	81	59	14	36	6	5	37	10	14	5	8	2	2	1
4	44	36	8	5	5	2	1	14	0	1	1	10	1	4	0
5	60	33	27	11	19	3	3	18	5	1	0	0	0	0	0
6	198	111	87	30	37	5	2	61	41	10	5	5	2	0	0
7	92	47	45	16	28	7	7	12	5	0	1	8	4	4	0
8	113	66	47	9	18	11	15	35	7	3	4	6	1	2	2
9	351	244	107	25	43	27	17	67	14	30	7	85	14	10	12
10	36	22	14	6	5	1	3	7	0	4	2	3	2	1	2
11	38	22	16	4	8	7	1	3	3	3	2	5	2	0	0
12	84	46	38	7	19	5	6	21	7	5	1	6	5	2	0
13	12	7	5	1	1	0	1	1	0	2	0	3	1	0	2
14	179	103	76	14	23	1	0	78	45	5	4	5	4	0	0
15	40	22	18	2	10	4	1	11	4	2	0	2	2	1	1
16	223	131	92	23	33	10	13	59	31	15	3	20	7	4	2
17	10	4	6	1	3	2	2	0	1	0	0	0	0	1	0
18	168	99	69	17	25	2	1	61	37	7	4	9	2	0	0
19	393	232	161	20	36	1	1	155	96	22	6	33	21	1	1
20	202	118	84	16	51	29	10	42	15	10	1	17	5	4	2
21	174	79	95	30	70	14	19	27	4	5	0	2	2	1	0
22	294	177	117	50	65	40	28	52	16	12	3	20	5	3	0
23	23	15	8	1	7	4	1	9	0	1	0	0	0	0	0
GRAND TOTAL	2,960	1,752	1,208	321	560	192	140	790	349	156	50	253	84	40	25
PERCENTAGES				18.3	46.4	11.0	11.6	63.8	68.7	12.6	9.9	20.4	15.5	3.2	4.9

TABLE II (b)

Table showing the result of the Mantoux test in each street (adults, and children 15 years and below)

Number of street	Number of positives		Percentage of positives		
	Adults	Children	Adults	Children	A and C
1	20	4	50.0	36.4	40.1
2	7	7	41.2	38.9	40.0
3	61	18	75.3	30.5	56.4
4	29	2	80.6	25.0	70.5
5	19	5	57.6	18.5	40.0
6	76	48	68.5	55.2	62.6
7	24	10	51.1	22.2	37.0
8	46	14	69.7	29.8	53.1
9	192	47	78.7	43.9	68.1
10	15	6	68.2	42.9	58.3
11	11	7	50.0	43.8	47.4
12	34	13	73.9	34.2	56.0
13	6	3	85.7	60.0	75.0
14	88	53	85.4	69.7	78.2
15	16	7	72.7	38.9	57.5
16	98	43	74.7	46.7	63.2
17	1	1	25.0	16.7	20.0
18	80	43	80.0	62.3	73.2
19	211	124	91.0	77.0	85.2
20	73	23	61.9	27.4	47.5
21	35	6	44.3	6.3	23.6
22	87	24	49.2	20.5	37.4
23	10	0	66.7	..	43.5
GRAND TOTAL	1,239	508	..	..	..
PERCENTAGES	70.7	42.0			

TABLE III

Table showing Mantoux test results according to sets

	Total number	—	±	+	++	+++	++++	Total number of positives	Percentage of positives
Males ..	1,524	413	163	624	121	146	27	918	60.2
Females ..	1,436	438	169	515	85	191	38	829	57.7
Total ..	2,960	851	332	1,139	206	337	65	1,747	59.0

TABLE IV

Table showing Mantoux test results according to community

	Total number.	—	±	+	++	+++	++++	Total number of positives	Percentage of positives.
Hindus ..	2,570	765	258	1,005	183	302	57	1,547	60.2
Muslims ..	269	79	60	90	13	21	6	130	48.3
Christians	121	37	14	44	10	14	2	70	57.9
Total ..	2,960	881	332	1,139	206	337	65	1,747	59.0

TABLE V

Table showing Mantoux test results according to occupation

Occupational groups	ADULTS			CHILDREN		
	Total number	Positives	Percentage of positives	Number	Positives	Percentage of positives
Housewives ..	596	411	69.0	10	5	50.0
Weavers ..	260	217	83.5	77	54	70.1
Clerks ..	98	65	66.3	..	..	..
Dhobis ..	82	62	75.6	25	11	44.0
Merchants ..	81	57	70.4	12	5	41.7
House servants ..	71	45	62.2	45	19	42.2
Teachers ..	55	41	74.5	..	..	..
Students ..	90	56	62.2	..	..	..
School children ..	..	..	..	480	218	45.4
Peons ..	45	26	57.8	1	0	..
Milkmen ..	27	19	70.4	3	3	..
Coolies ..	23	14	60.9	4	3	..
Hotel-keepers ..	21	10	47.6	2	..	..
Motor drivers ..	19	16	84.2	..	..	..
Beedi makers ..	16	15	93.8	11	7	63.7
Goldsmiths ..	10	9	90.0	1	1	..
Butchers ..	10	7	70.0	..	..	..
Nurses ..	10	8	80.0	..	..	..
Tailors ..	10	8	80.0	2	0	..
Masons and carpenters ..	19	16	84.2	5	3	..
Miscellaneous ..	81	57	70.4	7	2	..
Children (not school) ..	..	..	..	523	177	33.8
Unemployed ..	125	80	64.0	..	..	..
Total ..	1,752	1,239	..	1,208	508	..

and 5 the houses are entirely different from the rest of the houses, being mostly small thatched mud huts, whereas the rest of the houses are pucca-built houses. These huts are mainly in

open ground on the outskirts of the town proper. These houses are generally too small to accommodate the whole family for sleeping, and are chiefly store-rooms, and except in rainy weather,

TABLE VI

Mantoux test and monthly income per head

		Rs. 0-5	Rs. 6-10	Rs. 11-15	Rs. 16-20	Rs. 21-25	Rs. 26 or more
1,752 adults ..	Total Positives Percentage positive.	1,069 771 72.1	358 256 71.5	115 80 69.6	88 57 64.8	44 21 47.7	78 54 69.2
1,208 children ..	Total Positives Percentage positive.	792 348 43.9	237 105 44.3	49 17 35.9	76 25 32.9	24 3 12.5	30 10 43.3
2,960 adults and children together.	Total Positives Percentage positive.	1,861 1,119 60.1	595 361 60.7	164 97 59.1	164 82 50.0	68 24 35.3	108 64 59.3

TABLE VII

Mantoux test and income according to streets

Street number ..		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Rs. 0-5	Total	26	15	66	16	26	82	35	45	186	6	17	35	2	45	15	68	2	63	138	49	0	125	7
	Positives	11	6	50	11	13	58	19	32	145	6	9	23	2	38	11	55	0	51	127	35	..	62	7
	% positive	42	40	76	69	50	71	42	71	78	..	53	66	..	84	73	81	..	81	92	71	..	50	..
Rs. 6-10	Total	5	1	3	15	2	17	12	13	42	15	1	6	4	28	7	34	2	22	45	32	9	36	..
	Positives	4	1	2	14	2	13	5	9	35	8	0	6	3	25	5	23	1	17	40	17	5	15	..
	% positive	..	..	..	93	..	77	42	69	83	53	..	..	..	89	..	68	..	77	89	53	..	42	..
Rs. 11-15	Total	7	1	5	2	2	1	0	5	6	0	2	2	0	12	0	10	0	11	10	17	11	10	1
	Positives	5	0	3	2	2	1	..	3	4	..	2	2	..	9	..	5	..	9	10	10	5	7	1
	% positive	..	..	..	..	..	..	..	..	..	..	..	..	..	75	..	50	..	82	10	59	46	70	..
Rs. 16-20	Total	0	0	0	1	3	1	0	2	2	1	2	2	1	6	0	11	0	0	17	9	20	5	5
	Positives	..	..	..	1	2	0	..	1	2	1	0	2	1	5	..	9	..	..	15	5	10	2	1
	% positive	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	82	..	..	88	..	50	..	..
Rs. 21 and above.	Total	2	0	0	2	0	10	0	1	8	0	0	1	0	12	0	8	0	3	22	11	36	1	2
	Positives	0	..	..	1	..	4	..	1	6	..	..	1	..	11	..	6	..	3	19	6	15	1	1
	% positive	..	..	..	..	..	40	..	..	..	..	..	..	..	92	..	..	..	..	86	55	42	..	..

TABLE VIII

Mantoux test according to living space per head

		Up to 100 c. ft.	101-200 c. ft.	201-300 c. ft.	301-500 c. ft.	501-1,000 c. ft.	1,001-1,500 c. ft.	Above 1,500 c. ft.
1,752 adults	Total Positives Percentage of positives.	81 60 74.1	200 148 74.0	268 200 74.6	393 258 65.7	534 388 72.7	169 114 67.5	107 71 66.4
1,208 children.	Total Positives Percentage of positives.	76 34 44.7	160 75 46.9	196 80 40.8	310 114 36.8	334 148 44.3	83 33 39.8	49 24 16.3
2,960 adults and children.	Total Positives Percentage of positives.	157 94 59.9	360 223 61.9	464 280 60.3	703 372 52.9	868 536 61.8	252 147 58.3	156 95 60.9

the family mostly sleep outside in the open. If these two streets, or rather groups of houses, are subtracted from the figures in table VIII, with 100 adults and 90 children, we find that the percentage for tuberculous infection in the houses with little space changes considerably (see table IX).

If the figures are arranged with regard to the number of individuals sleeping in a room, the figures shown in table XII are found.

(viii) *Tuberculous infection in relation to known contact with tuberculous disease.*—In the 900 families surveyed, an attempt was made to

TABLE IX
Mantoux test according to living space per head excluding two streets

		Up to 100 c. ft.	101-200 c. ft.	201-300 c. ft.	301-500 c. ft.	501-1,000 c. ft.	1,001-1,500 c. ft.	Above 1,500 c. ft.
1,652 adults	Total Positives Percentage of positives.	51 51 100.0	178 141 79.2	258 199 77.1	363 252 69.4	526 385 73.2	169 114 67.5	107 71 66.4
1,118 children.	Total Positives Percentage of positives.	34 27 79.4	150 74 49.3	192 80 41.7	280 110 39.3	330 148 44.8	83 33 39.8	49 24 16.3
2,770 adults and children.	Total Positives Percentage of positives.	85 78 91.8	328 215 65.6	450 279 62.0	643 362 56.3	856 533 62.2	252 147 58.3	156 95 60.9

If we consider the question of infection from the point of view of living space per head in each street, the following figures are found for adults (table X) and children (table XI):—

find out in how many there had been known contact with persons suffering from active tuberculosis, either within the family itself, or with persons outside the family. The following table

TABLE X
Adult positives according to house space per head in each street

Street number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Up to 100 c. ft.	Total Positives % positive	2 1 ..	1 .. 75	20 15 ..	0 .. 64	14 9 69	16 11 69	.. .. ..	3 2 ..	5 3 ..	2 1 ..	.. .. ..	.. .. ..	2 2 ..	.. .. ..	2 2 ..	.. .. ..	.. .. 100	12 12 ..	2 2..	......	......	..
101-200 c. ft.	Total Positives % positive	3 2 ..	7 5 ..	41 30 73	3 3 ..	4 2 ..	18 13 72	2 3 ..	5 13 68	19 13 ..	.. .. ..	9 4 ..	.. .. 92	13 12 92	.. .. ..	23 17 74	.. .. ..	11 10 91	25 24 96	1 1 ..	.. .. ..	16 9 56	..
201-300 c. ft.	Total Positives % positive	2	2	6 6 ..	1 1 ..	3 70 71	28 3 71	5 12 71	17 26 93	28	3 1 ..	11 7 74	.. .. ..	22 19 86	8 5 ..	34 24 71	.. .. ..	13 10 77	47 42 89	4 4 ..	3 2 ..	31 17 55	..
301-500 c. ft.	Total Positives % positive	10 4 40	7 2 ..	8 4 ..	11 9 82	8 4 ..	28 20 71	14 7 50	27 6 60	64 49 77	.. .. ..	7 1 ..	8 3 ..	3 7 7	7 6 ..	36 27 75	2 1 ..	25 20 77	43 40 89	18 9 50	17 7 41	59 24 41	1
501-1,000 c. ft.	Total Positives % positive	9 6 ..	.. .. ..	5 5 ..	9 6 ..	4 3 ..	14 8 57	24 12 50	27 21 78	76 64 84	10 7 70	5 5 ..	12 10 83	3 2 ..	44 27 ..	7 5 74	23 17 ..	2 34 85	69 63 91	62 39 63	50 39 44	39 21 54	6
Above 1,000 c. ft.	Total Positives % positive	14 7 50	.. .. ..	1 1 ..	12 10 ..	.. .. ..	7 4 ..	2 2 ..	4 2 ..	52 37 71	10 7 70	7 4 ..	6 6 ..	1 1 73	.. .. ..	13 11 85	.. .. ..	16 11 69	36 30 83	31 18 58	9 4 ..	32 16 50	8 3 ..

TABLE XI

Children positives according to house space per head in each street

Street number ..		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Up to 100 c. ft.	Total	1	5	13	..	16	..	3	5	2	..	..	..	..	3	..	2	..	..	13	1	..	1	..
	Positives	..	4	5	..	3	..	2	3	1	..	..	..	..	2	..	2	..	..	9	..	..	..	..
	% positive	..	..	39	..	19	..	..	..	..	..	..	..	..	..	..	..	..	..	69	..	..	..	..
101-200 c. ft.	Total	1	2	34	1	3	13	4	..	14	..	1	10	..	10	..	20	..	5	24	4	..	14	..
	Positives	..	..	10	..	1	7	..	..	10	..	1	2	..	6	..	10	..	1	21	1	..	5	..
	% positive	..	..	30	..	..	54	..	..	71	..	..	20	..	60	..	50	..	..	88	..	..	36	..
201-300 c. ft.	Total	2	1	3	..	1	22	4	21	13	..	..	9	..	17	11	13	..	8	25	7	10	29	..
	Positives	..	..	2	..	..	12	1	6	1	..	..	3	..	10	4	5	..	5	19	5	..	7	..
	% positive	..	..	..	..	..	57	..	29	8	..	..	..	..	59	36	39	..	..	76	..	..	24	..
301-500 c. ft.	Total	2	10	7	4	5	20	13	2	29	..	8	3	3	12	5	33	6	11	41	12	34	47	3
	Positives	..	3	1	1	1	11	4	..	11	..	4	1	1	7	3	17	1	6	33	..	2	7	..
	% positive	..	30	..	..	..	44	31	..	38	..	..	..	..	58	..	52	..	56	81	..	6	15	..
501-1,000 c. ft.	Total	..	..	2	1	2	14	19	17	30	11	4	13	2	25	2	14	..	23	43	43	48	18	3
	Positives	..	..	..	..	..	6	4	8	14	5	1	4	2	23	..	6	..	21	33	15	2	4	..
	% positive	..	..	..	..	..	43	21	47	47	46	..	31	..	92	..	43	..	91	77	35	4	22	..
Above 1,000 c. ft.	Total	5	..	..	2	..	3	5	2	20	3	3	3	..	9	..	10	..	22	15	17	3	8	2
	Positives	4	..	..	1	..	2	1	..	11	1	1	3	..	5	..	4	..	10	9	2	2	1	..
	% positive	..	..	..	..	..	..	..	..	55	..	..	..	..	..	..	40	..	46	60	12	..	..	..

TABLE XII

Positives according to number sleeping in a room

			1 person to a room	2 persons to a room	3 persons to a room	4 persons to a room	5 persons to a room	6 persons or more to a room
Adults ..	Total	..	66	487	510	329	176	154
	Positives	..	45	336	391	236	122	106
	Percentage of positives	..	68.2	69.0	73.0	71.7	69.3	68.8
Children ..	Total	..	15	232	400	230	157	174
	Positives	..	6	74	196	96	80	56
	Percentage of positives	..	40.0	31.9	49.0	41.3	51.0	32.2
TOTAL ..	Total	..	81	719	910	559	333	328
	Positives	..	51	410	590	432	202	162
	Percentage of positives	..	63.0	57.0	62.8	77.3	60.7	49.4

gives the numbers for infection shown by the Mantoux test :—

(ix) *Physical and x-ray examinations.*—It was impossible in the present survey to examine

TABLE XIII

Tuberculous infections in relation to known contact

			—	±	+	++	+++	++++	Number of positives	Percentage of positives
Adults ..	Contacts	372	47	27	152	39	95	12	298	80.0
	Non-contacts	1,380	274	165	638	117	158	28	941	68.2
Children ..	Contacts	249	90	20	76	16	35	12	139	55.8
	Non-contacts	959	470	120	273	34	49	13	369	38.5
TOTAL ..	Contacts	621	137	47	228	55	130	24	437	70.4
	Non-contacts	2,339	744	285	911	151	207	41	1,310	56.0

If the figures of infection percentages are examined for a few of the streets separately, the results are as shown in table XIV.

the whole population by physical and x-ray examinations, and, therefore, in an attempt to find out how many were suffering from active

TABLE XIV

Mantoux positives in contact and non-contact in certain streets

Number of street	Total number of families	Number of families with history of contact	CONTACT				NON-CONTACT		
			Persons		Positives	Percentage of positives	Persons	Positives	Percentage of positives
9	119	21	Adults ..	45	39	86.7	199	153	76.9
			Children ..	24	14	58.3	83	33	39.8
16	62	15	Adults ..	42	34	81.0	89	64	71.9
			Children ..	34	16	47.1	58	27	46.6
18	49	6	Adults ..	22	18	81.8	77	62	80.5
			Children ..	16	15	93.8	53	28	52.9
19	88	22	Adults ..	76	71	93.4	156	140	89.7
			Children ..	52	40	76.9	109	84	77.1
21	45	8	Adults ..	17	10	58.8	62	25	40.3
			Children ..	12	3	25.0	83	3	3.6
22	98	14	Adults ..	31	18	58.1	146	69	47.5
			Children ..	19	8	42.1	98	16	16.3

tuberculosis, those who reported suspicious symptoms and those who showed a ++, +++ and ++++ Mantoux were examined physically, and as many as possible had an x-ray photograph taken. Of 704, who were selected for examination for one of the above reasons, 13 refused examination, and 53 could not be found, leaving 638 who were examined by physical examination, and of these 241 were examined by x-ray also.

Total number examined physically ..	638
Number showing abnormal physical signs requiring further investigation ..	186
Number showing signs of non-pulmonary tuberculosis ..	6
Number showing no physical signs of tuberculosis ..	446

Of the 186 showing some physical signs in the lungs, 126 were x-rayed; in addition, 1 with bone tuberculosis was x-rayed, and also 114 showing a strong Mantoux but no physical signs suggesting tuberculosis.

The results of the physical and x-ray examinations were classified as follows:—

- Those definitely showing an active tuberculous lesion which needed treatment.
- Those showing signs suggesting active tuberculosis but who needed further observation before it could be decided whether treatment was necessary.
- Those who showed signs of tuberculosis, probably not active, but who should be checked up from time to time.

Of the 60 persons who showed physical signs in the lungs but who were not x-rayed, evidence of active tuberculosis was certain in 5; the others needed further examination and observation for certainty. Besides, 5 patients not x-rayed were

found to be suffering from non-pulmonary tuberculosis, 3 glandular, 1 abdominal, 1 bone.

	WITH x-RAY SIGNS			
	Active disease requiring treatment	Further observation needed	Checking needed	No x-ray signs
Those showing physical signs (including 1 case of bone tuberculosis).	18	47	8	54
Those showing no physical signs but with strong Mantoux.	3	57	6	37
Those with no physical examination.	2	3	7	..
TOTAL ..	23	107	21	91

This makes a total of definitely active cases of tuberculosis of 33. Experience with observing the type of case included under those classified as needing further observation, leads us to conclude that a large percentage of those 107 individuals also have an active lesion requiring treatment. It is specially important to note that of those 107 individuals, 54 were children under 12 years of age.

(x) *Sputum examination*.—Sputum examinations by the ordinary smear method were made for 124 persons, in whom the examination was repeated one to three times in 90. A

positive sputum was found in 8 persons, all of whom showed both physical and x-ray signs of active tuberculosis.

(xi) *Deaths from tuberculosis during survey.*—Of those classified as having active tuberculosis needing treatment, 4 died of tuberculosis during the survey, and of those classified as needing further observation, 2 also died of tuberculosis. Further, 2 others tested by Mantoux died of tuberculosis, without other examinations being made.

In addition to the above deaths from tuberculosis among those in the survey, information was given that 7 others also died of tuberculosis in the streets in which the survey was made but who had not been examined. It may be remarked that several houses in which it was definitely known that there were cases of active tuberculosis, and some of whom were even under treatment, refused co-operation, not wishing it to be known that they had tuberculosis in the family.

Therefore, the total deaths from tuberculosis in the area surveyed during the period of the survey was known to be 15.

Discussion

(i) *General infection rate.*—Using mostly an intradermal injection of a 1/500 dilution of tuberculin, a positive reaction was found in 1,924 or 58.1 per cent in a total of 3,309 people. There has been little work hitherto in India dealing with an unselected population and so comparisons are not easy to make. An investigation in Chittoor District (Benjamin, 1938) by the von Pirquet test of 6,665 unselected people showed a percentage of 37.8 for adults and 10.8 for children under 15, and 40.1 for adults and 11.6 per cent for children living in small towns, and 30.8 per cent for adults and 8.2 per cent for children living in villages. It is to be expected that the percentage of positives in a town like Saidapet close to Madras would be higher than in small towns up-country.

(ii) *Sex and community.*—The figures for sex show no appreciable difference.

As regards the figures for community, apart from the Hindus, the figures are very small for any reliable deductions to be drawn as to community infection rate.

(iii) *Occupation.*—Of the large groups, the adult weavers show a high infection percentage of 83.5, although several smaller groups, such as *beedi* makers and goldsmiths, show an even higher percentage. It is noticeable, too, that children engaged in these occupations show a very high rate also, being for weavers 70.1 per cent, and for the few *beedi* workers 63.7 per cent; all the other figures for children, even those working, being considerably less, between 41 and 50 per cent. Apart from the figures mentioned above, there is not much variation in different occupations.

(iv) *Infection rate in children.*—The figures for Saidapet, separating adults and children

under 15, show a positive Mantoux for adults 69.8 per cent, and children 41.2 per cent. This indicates a high infection rate for the whole population, but it is specially high for the children, much higher than is normally found in such investigations in Europe and America, and very much higher than the figures for the town children in Chittoor District. For example, an investigation by Chadwick and Zacks (1930) into 101,118 children in Massachusetts showed 28 per cent positive in children under 15 years of age, mostly in towns, and Dow and Lloyd (1931) dealing with 1,220 children, partly contacts of tuberculous parents in London, found 27.2 per cent positive. The figure of 41.2 per cent for Saidapet for children under 15 years of age, therefore, indicates a serious situation with very early infection. It also indicates that infection takes place mainly before the children are much in contact with the outside world. It points rather to serious home, or possibly school, infection which requires further investigation.

(v) *Variation in infection in streets.*—Another point worthy of note is the high infection rate of certain streets such as for example no. 19 street where as many as 211 out of 232 adults show a positive Mantoux, i.e., 90.5 per cent, and children as many as 124 out of 161, or 77.0 per cent. On the other hand, in no. 21 street only 35 out of 79 adults show a positive, i.e., 44.3 per cent, and 6 out of 95 children, i.e., 6.3 per cent. No. 19 street is a crowded street with a number of different families living in each house, whereas in no. 21 street the houses are mostly government quarters, not crowded together. In most of the streets the various occupations are fairly well distributed, but in no. 9 street the majority of people are weavers. The high infection-rate (68.1 per cent) in this street may be due to the occupation and the conditions under which they work. As was pointed out under the discussion on occupation, the figures for the weavers were one of the highest, and 171 of the 264 adults in this street are weavers, and 37 of the total number of 107 children are also working at weaving. Of the adult weavers in this street, 83.1 per cent were positive, and of the children 78.7 per cent.

(vi) *House space per head and sleeping space.*—As one of the factors which might cause variation in street infection rates, an investigation was made into the cubic feet of space per head for each individual and also the number sleeping in a room.

When all the houses in the survey were included, there was surprisingly little variation in infection percentage, whether the living space was small or large, the only noticeable drop being for children in the houses with over 1,500 cubic feet per head, the percentage being only 16.3, as compared with from 36.8 to 46.9 per cent in the other groupings. From the general figures in table VIII one would seem to be justified in inferring that the size of the house does not appreciably influence the infection rate, at least

as a factor by itself. On the other hand, when a group of houses in which the general style of living is quite different are excluded (table IX), there does seem to be a higher rate of infection for the small houses of the type occupied by the general population of the area surveyed. It is noteworthy that the houses in the two streets excluded (no. 3 and 5) are isolated from the main town streets and are situated in fairly open surroundings, and in addition the people who occupy these houses mostly sleep outside the houses. This may be an explanation for the considerably lower rate of infection found among these people, though their houses are small. Again it should be noted that in another area where the infection rate is low, no. 21 street, the houses here also are separated from the main town and stand in open ground, although they are of a far different type from those in streets 3 and 5, being houses built by government for government officials of the secretariat.

Another point which has a bearing on the question of living space and infection is dealt with in tables X and XI where it will be seen that in those streets where it is possible to find sufficient numbers of houses in the various groups for comparison, there is not a really significant variation in infection-rate in the various cubic space groupings. The difference seems to be a street difference, i.e., the infection-rate is fairly constant for all houses in a particular street; this is possibly due to some peculiarity in the habits of the people of that street. This will be commented on again later.

If we group the people tested according to the number sleeping in one room, little difference again is seen, the variation in adults being between 68.2 and 73.0 per cent positives for persons sleeping in a room up to 6 in a room, and for children of from 32.0 to 51.0 per cent, the lowest figure surprisingly being found for those with only one room for 6 or more persons. One possible explanation is that when the weather allows, many of those in the crowded houses sleep in the open. But the whole question seems to require further investigation with a larger group, as it goes contrary to what is found in other parts of the world.

(vi) *Economic condition.*—Tuberculosis is commonly said to be 'the poor man's disease', but the figures obtained so far in Saidapet definitely contradict this idea and in fact would generally seem to point the opposite way.

In the general table VI there is very little variation except in one group which happens to be a small group (those with a monthly income of Rs. 21 to 25), and this particular variation might be due to an 'error in sampling'. The wealthiest people do not show any significantly less infection-rate than the poorest. On looking into the question of variation according to streets and monthly income, we find again a street variation irrespective of the economic factor. For example, in table VII it will be seen that there is a variation of from 40.0 to 92.0 per cent

of infection in the poorest group in the different streets, and from 40.0 to 91.7 per cent of infection in the richest group in the different streets. But in the individual streets there is not much variation in the percentage of infection in the different economic groups, e.g., in no. 14 street the variation is between 75 and 92 per cent, and in no. 19 street between 86 and 100 per cent. At any rate, it is not the economic condition of the people which is the prime factor in the spread of infection.

(vii) *Contact infection.*—It is well known that the tuberculosis infection rate is much higher in those living in close contact with open cases of tuberculous. Our investigation confirms this by the figures for contacts being 70.4 per cent, as against 56.0 per cent for those giving a history of no contact. It should be noted that as many as 152 families with 621 persons out of 900 families give a history of contact and this contact was, with few exceptions, in the family itself.

The difference in the positives in contact and non-contact for adults and children separately is shown in table XIII, where contact adults show 80.0 per cent positive and 68.2 in non-contacts, and in children 55.8 per cent positives in contact and 38.5 per cent in non-contacts.

In considering contact and non-contact infection in certain streets, there is again found to be a wide street variation, adult contact showing a positive varying from 58.1 to 93.4 per cent in different streets, and children contacts from 42.1 to 93.8 per cent. In non-contacts also the variation in adults varies in different streets from 40.3 to 89.7 per cent, and in children from 3.6 to 77.1 per cent.

The difference between contact and non-contact infection is marked in the streets which show a general lower average of infection, but in the streets showing a general high infection rate there is not very much difference between contacts and non-contacts. This would seem to suggest that all living in the badly infected streets are practically living as contacts.

(viii) *Active tuberculous disease.*—In the survey 33 individuals were found to be suffering, without any doubt, from active tuberculosis requiring treatment. In addition, 107 needed further immediate observation, because of physical and x-ray findings, and, judging from experience elsewhere in the observation and following up of such cases, the probability is that even as many as half of them would be found to be suffering from an active tuberculosis, needing treatment. It may be mentioned that 2 of this group classified as needing immediate observation died of tuberculosis before the survey was completed. Another serious aspect of the problem is that 54 out of the 107 needing immediate observation were children under the age of 12. It is everywhere recognized that tuberculous disease in children is far more fatal than in adults.

If our inferences are correct it means that among the 3,309 persons examined, about 87 were suffering from active disease requiring immediate treatment, which is a very high figure, denoting a very serious situation.

A further point to be noted here is that many of the cases of active tuberculosis were only discovered by means of x-ray examination, and, therefore, if it had been possible to use x-ray examination in all cases, it is likely that still more of cases of active disease requiring treatment would have been discovered. That physical examination without x-ray is not enough has been proved by experience of all tuberculosis workers and is shown again here. Many cases of early tuberculosis cannot be detected without x-ray.

Another fact we should like to point out is that a good number of those suffering from active tuberculosis in Saidapet, even with a positive sputum, were going about their daily work, not knowing they were sick, and not conscious of their being a danger to society. For example, in this group there was one bus conductor, one clerk in a shop, one student attending college, and one watcher of a *choultry*.

Tuberculosis mortality

During the last 6 months it was ascertained definitely that 15 people had died of tuberculosis in the area surveyed. The total population of the area is approximately 6,500. This works out at a mortality rate for tuberculosis of 462 per 100,000 of the population. This is a minimum figure. It is a very high mortality rate compared with, for example, the figure for Manchester, England, of 104, which itself is a high figure for England, where the average is only 76 per 100,000 (Pearson, 1937).

If the other areas of Saidapet show the same mortality rate, it will mean that about 150 people die of tuberculosis every year in Saidapet.

Conclusion

In examining, the question of tuberculous infection-rate in the town of Saidapet, again and again we have been driven back to the fact that, whatever grouping we make, the infection-rate seems to run in streets. If we examine according to general infection-rate, according to economic condition, according to living space, according to contact with cases of tuberculosis, the rate varies in different streets. This holds good with both adults and children. What is it in these streets which in one instance causes a high infection-rate and in another a low rate? One possible clue is given in what has been mentioned that in streets 3, 5 and 21, the houses are separate, although in the first two the people are poor, and in the last comparatively well-to-do. Each family, and by that is meant father, mother and children with but few other relatives, lives in a single house. In the other streets, the houses are all joined together, and large families with many relatives live in a single

house, and if the family itself does not fill the house, then the rest is let out to tenant families, several of whom may be in a single house. Although the families are separate, there is much mixing together, and the effect is one large family. The result is that, if tuberculosis is introduced into a family and clinical disease results in even a single member, then all of the families in that house are contacts, and contacts to what may be massive infection. Moreover, the close proximity of the houses, and even the space in the houses, cause much interchange of people from one house to another, even if the families are different, and these, too, become contacts. This would suggest that it is not mainly the economic factor or the size of the house or the sleeping accommodation, but the method of living, which is the principal cause of spread of infection.

The survey so far carried out, even with a small proportion of the population like 3,309 people, is yet sufficient to show the seriousness of the tuberculosis problem in Saidapet. This position has only been revealed by the survey and was unknown before. If the rest of the town is as infected as the area surveyed, there are probably 800 to 900 people suffering from active tuberculosis, needing treatment in Saidapet.

This investigation has been carried out in Saidapet, but there is no reason to suppose that Saidapet differs in any way from other towns in south India as regards tuberculosis infection and morbidity. If this is so, it shows the magnitude of the tuberculosis problem which has to be faced, and the complexity of that problem.

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OBSERVATIONS ON SOME EPIDEMIOLOGICAL FACTORS OF TUBERCULOSIS IN SOUTH INDIA

(AS STUDIED FROM CASES AT THE GOVERNMENT TUBERCULOSIS HOSPITAL, MADRAS)

By K. S. SANJIVI, M.B.
(Madras Medical Service)

This paper attempts to draw certain conclusions on the epidemiology of pulmonary tuberculosis from an analysis of a thousand consecutive open cases and a thousand radiographs, studied at the Government Tuberculosis Institute, Madras, during 1936-37.

Table I gives the age incidence of the 1,000 open cases, 709 males and 291 females :—

TABLE I

Age	MALES		FEMALES	
	Number	Percentage	Number	Percentage
Less than 15	6	0.81	6	2.01
15-21	151	21.56	109	37.06
25-31	270	37.0	111	37.74
35-44	163	22.82	47	15.98
45-54	72	10.08	15	5.10
55-64	40	5.60	3	1.02
Above 64	4	0.56	0	0.0

It will be seen that high tuberculosis morbidity in females starts a decade earlier than in males and does not appear to be so much a problem in elderly women as in elderly men. That more than 16 per cent of male consumptives are past 45 years is an important fact to be remembered, as a large number of them pass off as chronic bronchitis, 6.9 per cent of all the cases had wheezing at the time of examination. It is well to remember that 'all that wheezes is not asthma'. The importance of this distribution to the economic life of the community by 83.3 per cent of the ailing men and 91.9 per cent of the ailing women being between the ages of 15 and 44, is too obvious to be dilated upon*.

Figure 1 shows that tuberculosis is no longer confined to urban areas. This rural permeation is only to be expected, considering the rapid

communications that exist to-day, the frequent exchange of men between the fields and the factories, and the comparative virgin state of the soil in the villages.

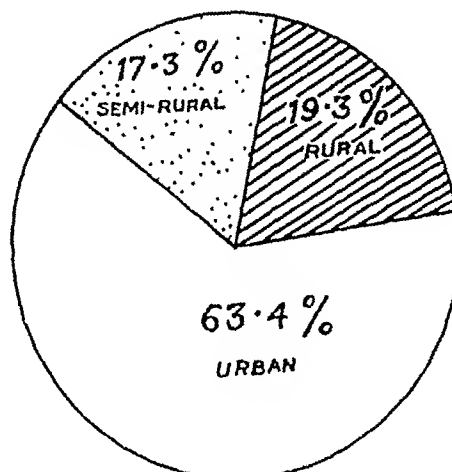


Fig. 1.

The 709 males have been classified below according to their occupation :—

TABLE II

Showing occupational incidence of tuberculosis

Farmers	.. 89	Weavers	.. 15
Coolies	.. 71	Tailors	.. 15
Mill-workers	.. 55	Sweepers	.. 15
Clocks	.. 45	Motor-drivers	.. 15
Food-handlers (milkmen, cooks, bakers, etc.)	.. 45	Carpenters	.. 14
Petty merchants	.. 39	Blacksmiths	.. 13
Peons	24	Beedi-makers	.. 12
Domestic servants	24	Masons	.. 8
Press-workers	.. 23	Police-men	.. 8
Students	21	Cartmen	.. 8
Teachers	.. 18	Fishermen	.. 7
Gold- and silver-smiths	.. 16	Painters	.. 5
		Unemployed	.. 71
		Miscellaneous	.. 33

When we consider the numbers actually engaged in each of these occupations (of which we have no accurate information) perhaps tuberculosis surveys amongst mill-workers, press-men, tailors, beedi-makers and weavers are likely to yield valuable data.

Whenever tuberculosis is diagnosed in an upper class family—and it is by no means rare among them—one hears loud protestations that it cannot be, as there has been no previous family history. Even so, how can the richest escape tuberculous infection when the food-handlers and children-handlers (teachers, servants, motor-drivers, etc.) form as much as 16.7 per cent in the above table.

* These figures do not present the true sex and age distribution of tuberculosis, but only the distribution amongst those attending the tuberculosis institute. The economically more important members of a household would tend to apply for medical relief first.—EDITOR, I. M. G.]

(Continued from previous page)

Dow, D. J., and Lloyd, W. E. (1931) *Brit. Med. J.*, n, p. 183.
Pearson, S. V. (1937). *Brit. Journ. Tuberculosis*, Vol. XXXI, p. 149.

TABLE III

Showing death rate of children of tuberculous persons

	Number married	Number of children born	Number of children (under 10 years) dead	Percentage dead
Males ..	354	1,324	528	39.9
Females ..	216	623	164	26.3

The percentage death rate for children under 10 in the general population is 4.0 (Russell, 1938)*. The death rate in the children of tuberculous parents is considerably more.

The definitely greater risk to the offspring when the open case is the father may be due to two reasons :—

Firstly, an incapacitated parent stays indoors all the time, and,

Secondly, the set-back in the economic level of the family due to the bread-winner's illness tells on the resistance of the children.

Of the 216 married women, 58 or 26.9 per cent dated their symptoms from a previous child-birth or abortion. Tuberculosis should not be forgotten in the differential diagnosis of fevers in child-bed. The number of the pregnancies did not appear to be of any significance.

TABLE IV

Showing the duration of the disease at the time of seeking treatment at the institute

	Number of cases		Number of cases
Less than 15 days ..	32	3 to 6 months ..	265
15 days to 1 month ..	87	6 to 12 " ..	175
1 to 2 months ..	119	More than 1 year ..	189
2 to 3 " ..	133		

It will be seen that only a third of the total have sought treatment earlier than three to six months after the manifestation of symptoms. Unless something effective is done to avoid this general delay it will be difficult to convince people that tuberculosis is curable.

TABLE V

Showing the initial symptoms complained of in these 1,000 cases

Fever alone ..	..	73
Cough alone or with weakness ..	..	405
Fever and cough ..	..	386
Hæmoptysis ..	..	40
Loss of weight or weakness ..	..	58
Pain in the chest ..	..	28
Dyspepsia ..	..	10

*[We do not understand this statement; in the report quoted the *infantile* mortality alone for Madras in 1936 is given as 164.1 per 1,000 live births, or 16.41 per cent.—EDITOR, I. M. G.]

Apart from the cases of initial hæmoptysis, 224 others had spat blood some time during the illness, hæmoptysis thus occurring in 26.4 per cent of all the cases. The importance of not ignoring a persistent unexplained cough, fever, weakness or hæmoptysis must be urgently brought home to the general practitioner. But, will educating the general practitioner alone ensure diagnosis? From table VI it will be seen that 49.7 per cent in this series had tried various non-descriptive, non-allopathic remedies before coming to the tuberculosis institute.

TABLE VI

Allopathic hospital or dispensary ..	406
Allopathic private practitioner ..	97
Non-descriptive remedies ..	497

This takes us to the larger question of organization of medical relief for the poorer classes, which is outside the scope of this paper. The fact that 82.7 per cent of these 1,000 open cases had gone beyond the stage of suitability for artificial pneumothorax further illustrates the urgent need for facilities for early diagnosis, and treatment. With the very meagre institutional accommodation we have, the vast majority of these advanced cases are turned back to their homes where conditions are ideal for the rapid dissemination of the seeds of tuberculosis. Some means of segregating the advanced open cases must, therefore, form a vital part of any programme of tuberculosis control.

Every case which, on a consideration of the symptoms, Mantoux test, sputum examination and clinical examination by two independent observers (the assistant surgeon and the director) appeared to be a case of pulmonary tuberculosis in whichever stage was x-rayed. In our country sifting of other evidence has to precede radiological examination as we cannot afford to use x-rays at the very commencement of our work in a tuberculosis clinic or in a survey. One thousand consecutive radiographs have been looked into and the tale they tell summarized.

TABLE VII

A. No active tuberculosis	
1. Non-tuberculous (bronchiectasis, abscess, etc.) ..	31
2. Hilus shadows with calcified spots ..	44
3. Peri-bronchial fibrosis ..	85
B. With active disease	
1. Without cavitation—	
(a) Deposits of varying size and extent ..	221
(b) Pleurisy (only visible lesion) ..	28
(c) Peri-bronchial infiltration ..	231
2. With cavitation—	
(a) Fibro-caseous disease ..	315
(b) Fibroid phthisis ..	45

Type B, 1, c in the above table, perhaps, requires a word of explanation. The 231 patients with distinct infiltration, linear and

apparently peri-bronchial in distribution gave a history of cough, bouts of fever, lassitude, etc. The Mantoux reaction and clinical examination gave further grounds for suspecting tuberculosis and they were x-rayed.

I can recall several cases in each of which a skiagram taken at the onset of the illness showed these appearances which were ignored and a few months later dense circular deposits appeared in the same region. But mostly, this type of case is resistant with a tendency to localization in fibrosis. Descriptions of similar appearances are given by Fishberg (1932) although he says 'the idea of peri-bronchial tuberculosis has been abandoned at present'. Perhaps it is best to call this type 'early spreading granuloma' following Wingfield (1937) and with him insist on the diagnosis of tuberculosis at this stage.

TABLE VIII

Showing percentage incidences of different lesions

	Present series	Dr. Benjamin's series (1938)
All cases with cavities ..	42.9	73.3
Cavities with hard fibrous walls among the above ..	20.0	5.9
Mid-zone lesions—		
In left lung ..	28.7	73.1
In right lung ..	26.6	71.2

For purposes of the above table, the percentage has been calculated on the 840 active cases, excluding the 160 cases in group A with no active disease.

A sanatorium gets only selected cases referred to it by other doctors, and usually, in our country, only at a stage when the private doctor feels he can tackle it no longer. It is hardly justifiable to conclude 'that the disease in Indian patients is acute, rapidly developing with little tendency to show a natural resistance and healing' on a study of a definitely selected sample. The present study based on an out-patient population of a tuberculosis institution shows that such an alarmist view need not be taken about the type of the disease. Even this series is, after all, a selected group, and it is only by the extensive random surveys of unselected groups together with the recognition of a stage of 'tuberculosis minor' that the exact situation regarding the type of tuberculosis in south India can be gauged.

My thanks are due to Dr. K. Vasudeva Rao, the Director, for permission to make the above study at the Government Tuberculosis Institute, Madras.

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- Benjamin, P. V. (1938). *Indian Med. Gaz.*, Vol. LXXIII, p. 540.
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BRONCHIECTASIS : ITS ÆTIOLOGY, PATHOLOGY, DIAGNOSIS, PROGNOSIS AND TREATMENT

By A. C. UKIL

and

K. N. DE

(From the Department of Chest Diseases, Medical College Hospitals, Calcutta)

THE term 'bronchiectasis' indicates a condition in which the bronchial tubes are dilated beyond their normal shape and size. Although during the last twenty years, careful clinical, radiological, bronchoscopic, bacteriological, histopathological and surgical work and experimental studies in animals have been carried out on chronic pulmonary suppurations and have contributed greatly to a clearer understanding of the conditions, still all the factors responsible for the causation of bronchiectasis are not yet well understood. Our knowledge on the subject has, however, become much more precise since the introduction of lipiodol bronchography by Sicard and Forestier (1922), the use of the bronchoscope in examining the bigger bronchi, and the anatomo-pathological study of lobectomized lungs, during the last few years.

The present paper is based on 160 cases confirmed by lipiodol bronchography done between 1931-38. An earlier paper by Ukil and De (1935) based on 80 cases, was presented before the Indian Science Congress. Although we are dealing with the subject in a warm climate, it will be seen that the condition is not at all rare and that practically all categories of cases are encountered, both in children and adults. In the absence of a correct appreciation of facts, cases have been wrongly diagnosed and treated, and even referred to sanatoria for the treatment of what had been wrongly diagnosed as pulmonary tuberculosis.

Ætiology and pathology

Bronchiectasis may be congenital or acquired. Congenital bronchiectasis is extremely rare and hence bronchiectasis is almost always an acquired disease.

In *congenital bronchiectasis*, the lesion is due to some anomaly of bronchial or pulmonary development. Two forms are met with—cystic and atelectatic. In the former, multiple cyst-like thin-walled dilatations, caused by anomalous bronchial or alveolar development, occur usually in one lung. They are frequently dry. The pleural surface is generally free from adhesions and looks bluish through the thoracoscopic. In the latter, dilated bronchi are found

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- Russell, A. J. H. (1938). *Ann. Rep. Pub. Health Commissioner, Govt. of India*, 1936. Vol. I. Manager of Publications, Delhi.
 Wingfield, R. C. (1937). *Pulmonary Tuberculosis in Practice*. Edward Arnold and Co., London.

associated with congenital atelectasis. Some of these broncho-pulmonary anomalies may remain symptomless and undetected until some time in adult life.

In *acquired bronchiectasis*, the essential change is a weakened bronchial wall due to the absence, atrophy, damage or destruction of the muscular and elastic tissues of the wall, frequently owing to infection. The mucosa becomes thickened and covered by inflammatory exudate and there may be a variable amount of associated inflammatory changes in the regional pulmonary parenchyma. As a result of the destructive changes, granulation-tissue formation and epithelial relining occur inside the damaged bronchi and cavities. In some cases, however, little or no inflammation of the bronchial wall is noticed and the principal change is an atrophy of the muscular and elastic tissues, along with regional atelectasis and peri-bronchial inflammation. Recent work on pulmonary inflammation indicates that the two types of change are frequently associated in one case, as it has been noticed that atelectasis of various grades frequently occurs during the healing of pneumonic diseases and in tuberculosis.

Bronchiectasis commonly follows broncho-pneumonia or bronchitis complicating whooping cough, measles, influenza and other acute infectious diseases, or results from the aspiration of an infected foreign body or of exudates from the upper respiratory tract (especially the nasal sinuses). The condition may be unilateral or bilateral, but the chief factor is the weakening of the bronchial wall. Partial obstruction of a bronchus may cause a rise in intra-bronchial pressure and thus be a contributory factor in bronchial dilatation in the presence of bronchi with weakened walls. Bronchial obstruction may occur from *within* (e.g., by aspirated foreign bodies, tenacious or inspissated sputum, neoplasm, gumma, etc., or inflammatory stenosis due to pneumonia, tuberculosis, etc.), or from *without* due to compression stenosis by adenopathy, aneurysm and obstructive atelectasis. Obstruction within the bronchus leads to stagnation of secretion in the lung area supplied by the obstructed bronchus, which again leads to decrease in normal movement and aeration of the area, factors which favour infection and consequent weakening of the bronchial wall.

In cases of bronchiectasis, a large number of mouth bacteria, especially staphylococci, streptococci, diphtheroids, pneumococcus, *M. catarrhalis*, *B. influenzae*, gain entrance into the lower broncho-pulmonary tract, multiply there and cause a variable degree of bronchitis and degeneration of the muscular and elastic tissues of the wall. In these cases there is no appreciable odour in the purulent or mucopurulent sputum, but in adults where anaerobic organisms, especially fuso-spirochetal associations, are present, the sputum becomes offensive in odour. So far as the action of the micro-organisms is

concerned, the nature of the tissue changes depends partly on the number, type and virulence of the organisms and partly on the sensitiveness of the tissues to the particular bacterial allergens concerned.

Even if we imagine that a bronchus is weakened by infection, it is by no means clear how the condition develops, but various factors seem to enter into its pathogenesis and mechanism. Of these, the most important are a weakening of the bronchial wall as a result of infection and raised intra-bronchial pressure. The bronchi dilate normally on inspiration, owing to the difference in pressure between the lumen of the bronchi and the thorax but they come back to normal again on expiration. Where bronchiectasis is occurring, the weakened bronchial wall causes a greater dilatation on inspiration, but, owing to the loss of elasticity of the wall, the return to a narrower lumen on expiration fails to occur. This is how gradually permanent, or pathological, dilatation takes place. It follows from this that anything that increases the negative pressure within the thorax will exert a greater dilating force on the bronchial walls, whether weakened by infection or not. This occurs in atelectasis of the lung, in which the negative pressure in the thorax becomes high, according as the condition occurs in patchy areas or in massive form. Both air vesicles and air tubes are equally exposed to the dilating force when present. In pure atelectatic bronchiectasis, there is usually diffuse cylindrical dilatation of the bronchi continuing to the pleura, with little or no involvement of the muscular and elastic tissue of the bronchial wall. Recent work on the pathogenesis of bronchiectasis emphasizes the rôle of atelectasis as the more important physical force which produces acquired bronchiectasis. [Andrus (1937), Lander and Davidson (1938)].

There are thus several factors which may operate in producing bronchiectasis—infection, obstruction (intra-bronchial and extra-bronchial) and atelectasis, to which may perhaps be added the traction of fibrosing inflammatory tissue around bronchi and bronchioles in various inflammations of the pulmonary parenchyma. Depending upon the extent, severity, and duration of the pathological processes, the dilated bronchial tubes assume different shapes—cylindrical (or tubular), fusiform, beaded, or saccular. A combination of these may be, and is often, present in the same case. Generally speaking, the cylindrical, fusiform, and beaded types result from an extensive, but comparatively mild, inflammation more or less limited to the bronchial walls, whereas the saccular type represents the end-stage of the process of necrosis with considerable fixed-tissue proliferation around, leading to subsequent abscess formation. Whatever the cause, the dilatations are nearly always surrounded by fibrous tissue, the cavities are lined with epithelium and the lower lobes of the lung are usually involved. The choice of

treatment depends a good deal on an appreciation of these factors.

The pulmonary circulation is not affected in the milder cases and in cases involving small areas, but in cases with advanced disease over wide areas and where there is much fibrosis, the right side of the heart may show evidence of dilatation. Absorption of septic material may lead to clubbing of the fingers and less commonly to hypertrophic pulmonary osteo-arthritis. In chronic cases, the absorption of toxins may lead to amyloid disease, albuminuria and enlargement of liver and spleen. Brain abscess from embolic infection may supervene as a fatal complication.

The following predisposing ætiological factors were elicited in 104 of our cases, no relevant information being available in the rest :—

Lobar pneumonia	..	48	cases
Influenza	..	10	"
Whooping cough and measles	..	7	"
Chronic bronchitis	..	6	"
Pleurisy	..	6	"
Following abscess of the lung	..	5	"
Asthma	..	4	"
Chronic malaria	..	4	"
Kala-azar (?)	..	4	"
Typhoid fever (?)	..	3	"
Dysentery (?)	..	3	"
Aspiration of foreign body	..	2	"
Tuberculosis of the lung	..	2	"
TOTAL	..	104	cases

The average period intervening between these illnesses and the first appearance of symptoms, as obtained from the statement of patients, was as follows :—the largest number gave it as 7 to 8 years, next 3 to 6 years, next 1 to 3 years, next 20 to 45 years, and lastly below one year.

It will be noticed that the history of aspiration of foreign body has been rarely obtained in our series. The workers of the ear, nose and throat department tell us that they have rarely seen aspiration sequelæ after tonsillectomy. Nasal sinus infection, especially of the maxillary sinus, however, is of frequent occurrence. Many of the cases of bronchiectasis with a history of 'cough and colds' since childhood arise from chronic suppuration from chronic sinusitis. It is thus an indirect factor in the causation of bronchiectasis, which gradually follows putrid bronchitis.

Some clinical features

Age incidence.—The following age incidence was obtained in our series :—

Years	Cases	Years	Cases
4 to 10	.. 2	36 to 40	.. 24
11 to 15	.. 6	41 to 45	.. 24
16 to 20	.. 16	46 to 50	.. 6
21 to 25	.. 22	51 to 60	.. 12
26 to 30	.. 23	Above 60	.. 2
31 to 35	.. 23		
		TOTAL	.. 160

Sex.—Of the total cases, males numbered 122 or nearly 76 per cent and females 38 or approximately 24 per cent.

Community and occupation.—Hindus numbered 108; Mahomedans 34; Indian Christians 8; Anglo-Indians 7 and Chinese 3.

The cases came chiefly from the non-industrial population. No special predilection for any occupation was noticed in the present series.

Provincial distribution.—The following distribution has been found in our series :—

Bengal 130, Behar 12, U. P. 5, Madras 5, Punjab 2, Bombay 2, Orissa 2, and Tippera State 2.

Out of the 130 cases from Bengal, 44 were from Calcutta, 40 from the neighbouring districts of 24-Parganas, Howrah and Hooghly and the remainder from 13 other districts, out of a total of 27 districts. No case was obtained from the hilly tracts in Darjeeling district and none from the neighbouring province of Assam. Probably the nearness of the investigating centre has accounted for over 50 per cent of the cases being drawn from Calcutta and the neighbouring districts. It is quite possible that, if a systematic search is made in outlying areas of the province, the incidence will be found to be much higher than it has been in the present investigation.

Radiographic and bronchographic types of bronchiectasis

1. *Congenital.*—Only two cases, probably of the cystic variety, were met with, one in a girl, aged 22 years, in whom the whole of the left lung was involved and the other in a man, aged 36 years, in whom the left lingual portion of the upper lobe and the lower lobes were involved. Both were symptomless and were accidentally discovered in the course of systematic physical examination for non-pulmonary complaints in 1933 and 1932, respectively. The former case is still symptomless and the latter has been lost sight of.

2. Acquired

A. Dry	..	..	.. 14 cases
B. Septic or suppurative:—			
Cylindrical or tubular	..	15	"
Early fusiform	..	19	"
Banded	..	2	"
Fuso-saccular	..	21	"
Saccular	..	58	"
Mixed	..	21	"
Bronchiectatic abscess	..	8	"
C. Atelectatic	..	3	"

It will be noticed that we have not been able to detect atelectasis of the involved lung, except in three cases. Case 11 cited in this paper is one of them and is an example of septic bronchiectasis following massive atelectasis of the left lung in a girl of seven years, as a consequence of the aspiration of a piece of betel-nut three months before. It will be noticed that comparatively few of the cases came to us in the early stages and that the advanced cases were practically never detected as bronchiectasis in the earlier stages prior to their investigation in this department.

*Localization of acquired bronchiectasis**A. Unilateral:*

Right lung—

Upper zone	..	..	5 cases
Middle zone	..	..	8 "
Lower zone	..	..	26 "
Both middle and lower zones	..	..	10 "
Entire lung	..	..	1 case

TOTAL .. 50 cases

Left lung—

Upper zone	..	..	1 case
Middle zone	..	..	8 cases
Lower zone	..	..	41 "
Both middle and lower zones	..	..	17 "
Entire lung	..	..	2 "

TOTAL .. 69 cases

B. Bilateral:

Both lower zones	30 cases
Both middle and lower zones	..	..	5 "
Middle zone of one lung and the lower of other	..	..	3 "
Entire lung of one side and lower zone of the other side	..	..	1 case

TOTAL .. 39 cases

It will be noticed that the lower lobe is much more commonly involved than the upper zones, and that the left lower lobe is more frequently involved than the right. Left-sided involvement seems to be more frequent. It shows further the necessity of exploring both lungs roentgenologically, especially if radical surgery is to be considered. Some of the illustrative lesions are reproduced in plates XVI, XVII and XVIII in most cases both before and after lipiodol. The history and physical findings of these cases are given below:—

Case 1.—D. S., Hindu male, aged 36 years, teacher. No relevant previous history of chronic respiratory infection or catarrh. No symptoms; came to hospital for the treatment of chronic dysentery. Condition detected accidentally during a routine physical examination.

Physical signs—crackling râles in front and friction-râles at back of lower half of left chest.

Case 2.—S. C. K., Hindu male, 36 years.

No relevant previous history except malarial attacks off and on; slight cough, without expectoration, for three months; small repeated hæmoptyses in clots every day for ten days before examination. No abnormal physical signs.

Case 3.—N. B., Mohammedan male, 56 years.

Chronic cough for five years; slight hæmoptysis once two years ago; expectoration—2 oz. per diem.

Physical findings—persistent crackling râles at back of right lower lobe.

Case 4.—S. R. A., Mohammedan male, 40 years.

Three attacks of broncho-pneumonia (? left) during the last ten years; cough for six months; expectoration profuse; hæmoptysis in streaks once ten days ago.

Physical signs—persistent crackling râles below inferior angle of right scapula and a few over left lower lobe.

Case 5.—H., Mohammedan male, 40 years.

Chronic cough for ten years; expectoration scanty; dyspnoea on exertion.

Physical findings—crackling râles over left lower lobe at back.

Case 6.—Mrs. U. G., Hindu female, 20 years.

Pneumonia three years ago, bilateral; chronic cough since then; expectoration 8 oz. a day; hæmoptysis, a fortnight ago; slight fever for 15 days; dyspnoea on exertion.

Physical findings—scattered rhonchi over both lungs.

Case 7.—F. C. G., Hindu male, 35 years.

Cough and expectoration for seven years; slight hæmoptysis off and on for five years; slight occasional fever.

Physical findings—scattered rhonchi over both lungs.

Case 8.—Mrs. R. K., European female, 32 years.

Bronchitis and pneumonia bilateral at age of ten years; expectoration—one tumblerful in 24 hours; dyspnoea on exertion.

Physical findings—slight loss of resonance and crackling râles over both lower zones.

Case 9.—D. L., Hindu male, 16 years.

Cough and moderate expectoration for six months; recurrent small hæmoptyses during the same period; slight fever off and on.

Physical findings—crackling râles over right, middle and lower zones of chest.

Case 10.—B. M., Hindu male, 30 years.

Measles at age of 8, followed by chronic cough which has continued; expectoration, moderate; occasional slight fever; dyspnoea on exertion.

Physical findings—crackling râles and friction; râles over both lower lobes.

Case 11.—Miss R. B. M., Hindu female, 7 years.

Aspiration of a piece of betel-nut three months ago; following this, cough and dyspnoea appeared; expectoration moderate but foetid for last seven days; marked dyspnoea; fever, maximum 101°F.; just admitted into hospital for bronchoscopic inspection and drainage.

Physical findings—pulse 120, respiration 40 at time of examination; increased resonance and bronchial breathing over the upper zone of left chest, râles over lower zone; slight swelling of hands and feet.

Diagnosis

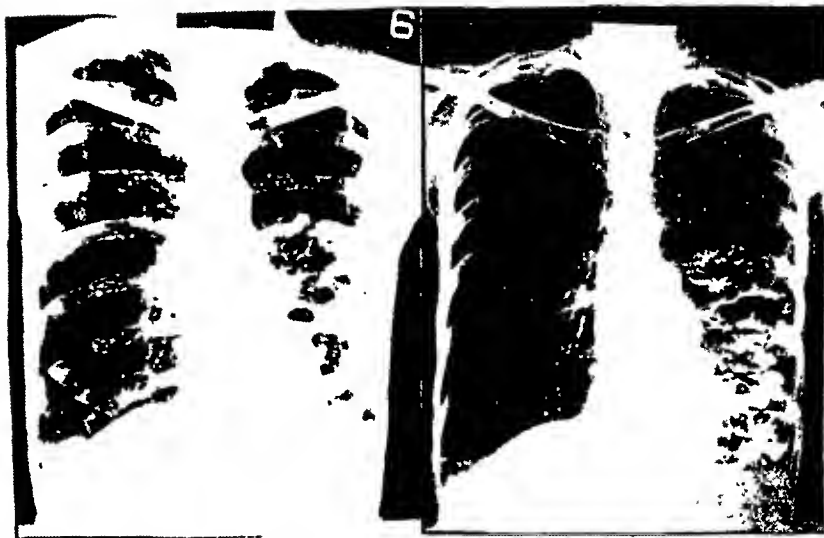
Symptoms.—The early clinical history of a case of bronchiectasis is often far from typical; in fact, it may be silent. The symptoms and physical signs will, no doubt, depend on (i) the position and type of dilatation and on the condition of the bronchi which may show very slight or early evidence of secondary inflammation producing no abnormal secretion, and (ii) the condition of the surrounding pulmonary parenchyma, which may be almost normal or show evidence of inflammation, fibrosis, atelectasis or thickened pleura.

The case-taking of a suspected case of bronchiectasis is very important and must be aimed at eliciting the history of possible ætiological factors since childhood. The onset may be acute, subacute or insidious, covering a period of 3 months to 20 years or more. The probable duration of symptoms, as obtained from the patients, was as follows:—less than one year = 23.7 per cent, 1 to 2 years = 35 per cent, 3 to 5 years = 12.5 per cent and 5 to 45 years = 28.8 per cent. The symptoms may be absent, slight or marked. In the absence of any symptoms referable to the chest, the condition may be discovered accidentally during a routine physical examination, as happened in one of our cases (case 1) who attended the hospital for the treatment of dysentery, or at *post-mortem* in patients dying of some other disease.

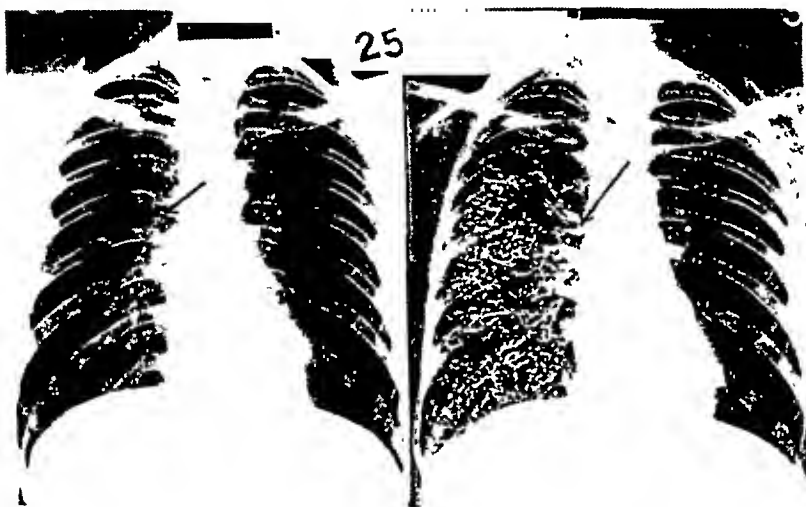
The patient may seek medical aid for chronic cough and expectoration, or for hæmoptysis, chest pain, fever, emaciation or dyspnoea. The cough, when present, may be slight or severe, intermittent or persistent. In cases with much secretion, the cough occurs when some secretion



Normal lipiodol skiagram.



Case 1. Congenital cystic dilatations, left middle and lower zones.



Case 2. Dry bronchiectasis.



Case 3. Cylindrical form, both lower lobes.



Case 4. Tubular and beaded form in right lower lobe and fuso-saccular in left lower lobe.

Skiagrams before and after lipiodol.

has collected and often with change of posture. A history of persistent cough and recurrent attacks of pneumonia or bronchitis in the same lobe since childhood or some years is very suggestive of bronchiectasis. The presence of clubbed fingers in such a case is an additional point in favour of the condition. *Expectoration*, when present, may be slight (less than 5i), moderate (5i to 5vi) or profuse (above 5vi) in 24 hours. In advanced stages of bronchiectasis with abscesses, there is often a foetid odour in the copious sputum. In the latter types of case, there is often fever, progressive emaciation, shortness of breath, clubbed fingers, sallow skin and an unpleasant odour in the breath. *Hæmoptysis* in small or large quantities may also occur. The copious sputum in suppurative types of bronchiectasis often separates into three layers on standing—an upper frothy layer, middle liquid layer and the lowermost of granular debris. Sputum examination gives persistently negative results for tubercle bacilli. Three per cent of our cases had no cough, 6 per cent had 'dry' cough and the remaining 91 per cent had cough with expectoration. Thirty-one per cent had scanty expectoration, 41 per cent moderate expectoration, 19 per cent profuse expectoration and 9 per cent had no expectoration. 17.5 per cent of the cases had foetid sputum. Twenty per cent of the patients complained of *chest pain* of some sort, 27.5 per cent had *fever* ranging between 99° to 100°F. (oral), 25 per cent gave history of some *loss of weight* and 11.5 per cent complained of *dyspnoea*. Fourteen per cent of the cases exhibited clubbed fingers.

Hæmoptysis, which is more frequent in bronchiectasis than in pulmonary tuberculosis, occurs in varying quantities. It may be the only symptom in a case or the sputum may be blood-tinged owing to mucosal congestion. Repeated hæmoptysis, at varying intervals, without any cough or sputum, may occur in 'dry' bronchiectasis. Seventy-nine per cent of our cases gave a history of hæmoptysis, 25.5 per cent of whom had a single hæmoptysis and 53.5 per cent recurrent hæmoptyses. Nineteen per cent of the cases had moderate to large hæmoptysis.

Physical signs.—On physical examination, the signs in the chest may be very varied. They may be absent or slight, or there may be only some retraction, limitation of movement and impaired percussion note, owing to fibrosis, over the area. The commonest finding, however, in moderately developed cases is medium 'crackling' râles at the end of inspiration in the lower third of the chest. This finding, along with a history of recurrent attacks of bronchitis, influenza or pneumonia in the lower third of the lung, is very suggestive. In more advanced cases, the râles may be coarse in character and, after coughing out of the sputum or after postural drainage, bronchial breathing or bronchophony may be elicited. In 6.3 per cent of our cases we had a type of biphasic creaking râles, called 'friction-râles', possessing the

characteristic quality of neither but some of both. This is almost pathognomonic of bronchiectasis. Clubbing of fingers, which is present in cases having defective drainage of the sputum, was noticed in 14 per cent of cases. The Wassermann reaction, which was done as a routine measure, was positive in 2.5 per cent of cases.

In some cases of lobar atelectatic bronchiectasis of the lower lobe, a triangular area may be mapped out alongside the vertebral column over which there is diminished resonance, bronchial breathing, increased whispered voice and medium râles. This type was noticed only in three cases. The incidence of the different signs elicited by us was as follows:—retraction of the chest wall on the affected side—5 per cent cases, comparative loss of resonance—2 per cent, diminished air entry—22.5 per cent, localized 'crackling' râles—37.5 per cent, localized 'friction râles'—6.3 per cent, bronchial breathing—5 per cent and no significant physical signs—8.7 per cent.

Sputum examination.—The examination of the sputum is important. If the quantity of sputum exceeds one ounce in 24 hours and if tubercle bacilli are not found on three consecutive examinations or by the concentration method, it should lead us to suspect bronchiectasis. Where the sputum is foetid, a search should be made, on gram-stained slides, for the presence of fuso-spirillar associations or other anaerobes.

Radiographical examination.—The next step in the procedure of investigation will be a fluoroscopic examination and radiography of the chest. Fluoroscopic examination helps us to detect if there is any fixation of the diaphragm (a very suggestive symptom) or if there is any area of ling in the lower part which shows increased detail. The radiograph may show areas which do not look like parenchymal infiltration but rather areas or bands of fibrosis or diffuse irregular haziness often extending from the hilum. In some of the advanced saccular types, appearances suggestive of thin-walled cavities may be present. The above radiographic findings, in the presence of a suggestive history and physical signs, are an indication for lipiodol bronchography, which coats the walls of the bronchi with the radio-opaque iodized oil and gives us an idea of the character and extent of involvement. In the meantime, an examination of the nasal sinuses, including radiography, should be done.

Lipiodol bronchography.—Before, however, lipiodol bronchography is done, every patient having expectoration should be postured with a view to emptying the cavities or tubes as far as possible. If possible, an inspection through the bronchoscope (or bronchial speculum) should be made to rule out the presence of stricture, neoplasm, foreign body or any congenital abnormality of the bronchi and to find out the condition of the mucous membrane of the bronchi, whether œdematous, purulent or

occluded. In case the latter condition is found, it is better to clear the tubes by aspiration in order to facilitate a more complete introduction of lipiodol into the affected bronchial tubes and saccules. Bronchoscopic examination was done in 76 of our cases and aspiration was carried out in 64 of them. In cases where the administration of autogenous vaccines from the secretions is desired, one can use the material from the end of the bronchoscope for culture. If the instillation of antiseptics into the cavities is desired, one can also introduce them through the bronchoscope. Gomenol (10 per cent—5 to 10 c.cm.) has thus been introduced in 50 of our cases.

In lipiodol bronchography, care should be taken to introduce the oil into the right portions of the lung, one at a time, by suitable adjustment of the position of the body of the patient, laterally, forward and backward and to have the skiagraph taken within three minutes of its introduction; otherwise the lipiodol reaches the alveoli and produces a blurred picture, vitiating the accuracy of the findings. Both lungs should be examined separately, including antero-posterior views, at an interval of 8 to 10 days. This is particularly important in case lobectomy is to be advised. After bronchography, the outlines and position of the dilated bronchi at once become evident and the diagnosis is clinched.

No serious accidents were encountered during or after lipiodol introduction. Three patients showed iodism and one had slight surgical emphysema around the site of injection.

Prognosis

Although one must admit that acquired bronchiectasis is a progressive disease and that, whatever the type of bronchiectasis—dry, cylindrical, or fusiform—it ultimately spreads, the gradual tendency being for tubular types to be transformed into fusiform and fusiform types to saccular, yet one meets with cases which have remained stationary over long periods or have even retrogressed. But it is usually difficult to foretell, in a given case, the course and outcome of the disease.

The prognosis is good in a case where the bronchus is dilated, but there is little or no abnormal secretion, and where the surrounding pulmonary parenchyma is relatively normal. The course in such cases may be quite long, 10 to 20 to 40 years, with very slight exacerbations. But, if each attack increases the extent of the disease, the patient may die eventually of broncho-pneumonia or intercurrent disease. There are some cases, on the other hand, which are rapidly progressive and where death takes place within a few years, if left untreated.

In judging about prognosis in Indian patients, it must be remembered that bronchiectasis is not probably so common and the exacerbations so frequent in the warmer tracts of India as it is in temperate climates. We have not yet been able to complete the follow-up of all cases and,

therefore, might be excused for citing the figures of Roles and Todd (1933). These authors based their conclusions on 106 cases of established bronchiectasis followed up over a period of three to six years in England. They grouped their cases into three classes: (1) dry type, which had recurrent hæmoptysis but no sputum, (2) cases with occasional sputum, and (3) fœtid cases in which copious foul sputum was a marked feature. Ten of the total of 14 cases in the first group, which is thought to be relatively benign, became infected within six years, three were dead and two totally incapacitated. The second group of cases were shown to have as bad a prognosis as the persistently septic or third group. These authors concluded that bronchiectasis in patients receiving medical treatment alone was an extremely fatal disease, as out of the 49 patients 23 were dead and nine were totally incapacitated, and of the remainder only four were 'dry' five years after the diagnosis was made—or a primary mortality of 47 per cent. They further showed that 18 of the 19 patients with septic bronchiectasis, who were treated by surgical methods, were quite well at the time of compiling the figures.

Owing to the great advances made in the surgical treatment of bronchiectasis, particularly by lobectomy in well-selected cases within the last few years, our ideas about the prognosis of a case has been considerably altered. In a recent series of 199 cases, operated on by Edwards (1939), the following mortality rate, according to age, was found:—

Four to 16 years—nil; 16 to 20 years—9.5 per cent; 20 to 30 years—14 per cent; 30 to 40 years—15 per cent; 40 to 50 years—31 per cent and above 50 years—nil.

The cure of a case depends on the correct localization of the changes and on a complete removal of the affected bronchi. A lower operative mortality is directly proportional to the type and extent of disease; the larger the area involved, the higher the mortality. The average mortality, which was 20 to 30 per cent some years ago, has been brought down to 5 to 10 per cent by improvements in the technique of operation and in careful pre-operative preparation and post-operative management.

Prophylaxis

From the figures supplied by us, it will appear that bronchiectasis is quite a common condition met with in the chest clinics in this country. Since the radical treatment of a well-established case of bronchiectasis requires a serious operation by surgeons possessing a high degree of technical skill and since such surgeons are not plentiful in India yet, it should be our aim to detect the condition at the earliest appearance of suspicious symptoms and before serious damage has been done. The public and especially parents should be told of the possible ætiological factors and to have all cases of chronic cough, for which no other cause is found,

thoroughly investigated, including the teeth, tonsils, and nasal sinuses. On the earliest appearance of symptoms in incipient cases, the patients may also be advised to effect a permanent change of domicile to a dry climate, which benefits the sinusitis as well.

Treatment

The treatment of bronchiectasis depends on the clinical type, on the extent of disease and its localization and on the nature of the infection.

The *congenital types* do not require any treatment unless there are symptoms. In *acquired types*, our aim should be to secure an early detection of the pathological condition and to prevent an extension of the disease by removing possible foci of infection in the upper respiratory tract and by measures aimed at improving the resistance to infection, such as living in a dust-free dry climate, taking a high-calorie and high-vitamin diet, heliotherapy, and the administration of autogenous vaccines. Autogenous vaccines were administered in 84 cases of our series. We cannot say that we obtained any striking benefit in many cases.

In cases of 'dry' hæmorrhagic bronchiectasis, if the hæmoptysis is small, no special treatment is required. If it is large and recurrent and if the exact localization has been determined, one has to advise lobectomy if radical treatment is desired.

In cases with troublesome cough, sedatives, which diminish the ciliary action within the bronchi, *i.e.*, the cough reflex, should be withheld. In comparatively early cases with expectoration, a planned programme of emptying the bronchial tubes of retained secretion by postural or bronchoscopic (suction) drainage should be carried out. Cough and sputum and toxæmia considerably disappear as a result of these procedures. They also decrease the chances of spread to other areas in the lung. Where fusospirillar associations are detected (42 cases in our series), we have given a course of solusvarsan or sulfarsenol injections with benefit.

If the disease is of long duration, before we give a decision as regards effective treatment we have to consider the type and extent of disease and to balance the risks of non-treatment and the probable results of palliative and radical operative treatment. The older the pulmonary infection, the less does it respond to conservative treatment.

Among *palliative measures*, the comparative advantages of bronchial drainage and collapse therapy may be considered.

In *postural drainage*, which is applicable to non-obstructive bronchiectasis, the patient lies on the side opposite to that of the basal bronchiectasis, leans over the side of the bed with the head almost touching the floor, so that the diseased side of the chest stands uppermost and higher than the neck and head. A special postural bed or table facilitates the procedure.

This position is maintained, at first from two to ten minutes, morning and evening, and gradually lengthened to half to one hour to completely empty the accumulated secretions. A patient can assume this position, with practice, for several hours daily without discomfort. In severe cases, it may be necessary to repeat the procedure several times daily and lengthen the interval as improvement sets in.

Where, however, an obstruction from congestion, œdema, granulation or otherwise is suspected or found, or where postural drainage, especially in bilateral cases, does not suffice, *bronchoscopic* (suction) *drainage* helps in effecting a considerable symptomatic improvement by relieving stagnation of secretions and sœtor, although the bronchial dilatation remains unchanged. If the obstruction is due to excessive granulations, their cauterization may re-establish the drainage. In cases with œdema of the bronchial mucous membrane, Samson (1938) advises spraying the area, through the bronchoscope, with a solution containing equal parts of 10 per cent cocaine and 5 per cent ephedrine, which has been found to help in the shrinkage of the mucosa and consequent improvement of drainage. A definite programme of bronchoscopic aspiration should be drawn up, say four to six aspirations at intervals of seven to ten days. If there is no clinical and roentgenological improvement within this period, further aspirations may be abandoned except during acute exacerbations. During the intervals between the bronchoscopic aspirations, daily postural drainage should be continued. In a large majority of cases, a great amelioration of symptoms takes place from drainage by these combined methods and lasts for quite a long time, *i.e.*, as long as the drainage is effective.

Bronchoscopy is, however, contra-indicated in aortic aneurysm, extensive laryngeal disease, cardiac infarction, cerebral embolism or thrombosis, hæmorrhage from bronchiectatic abscesses and marked hypertension and advanced cardiac failure.

Collapse therapy.—The choice of a method of surgical treatment requires much care and consideration. The object of collapse therapy is to keep the cavities empty and to prevent retention of secretions by reducing the size of or obliterating the dilated bronchi and also to put the diseased parenchyma at rest. Although the size of the dilatations may be decreased by the various procedures, there is very little evidence that the epithelium-lined bronchiectatic cavities are ever obliterated or return to normal size.

Phrenic crush or artificial pneumothorax might be considered as a possible procedure for incipient, unilateral, lower lobe cases but we have not been very happy with these methods. In case of pneumothorax, it has to be kept up for the rest of the patient's life, which is an obvious disadvantage. As regards paralysis of the diaphragm, admitting that it may help to alter the direction of the vertically-situated

dilated bronchi to a more horizontal position, it has the disadvantage of interfering with the cough-reflex which helps us to cough out the bronchial secretions. Although in isolated cases they have shown some benefit, the results in general are unsatisfactory. Although thoracoplasty has done undoubted good in some strictly unilateral cases where the whole lung has been involved, it fails in well-developed cases containing epithelium-lined cavities. Hence, the end-results are seldom good, as the diseased tissues do not disappear. In selected cases where the more radical procedure is not possible, thoracoplasty may be advised. Postural drainage must, however, precede and follow all these collapse-therapy procedures.

The field for radical or curative treatment

The only really effective treatment of bronchiectasis is to remove the diseased area entirely. It is very necessary for this purpose to determine how much of the area is actually diseased and whether the other lung is totally or practically free from infection and dilatation, as the operative mortality in bilateral cases of any degree of severity is very high. Although no case in the present series has been treated by lobectomy, it will be seen that, for various reasons and because patients do not come to us in comparatively early stages when the disease is limited, the field for this operation in this country is rather limited. We hope to be able to report the results of this operation in a subsequent paper.

The pre-operative preparation of the patient is important. Before deciding on the operation, it is assumed that both lungs have been thoroughly investigated by lipiodol bronchography, the apparently normal side being taken up first. We should prefer to select a case where the unilobar saccular bronchiectasis is limited to the lower lobe, where the extent of disease and general toxæmia are minimal, and where the general condition of the patient is good. Having selected such a case, our first step will be to eliminate all sources of infection in the upper respiratory passages. Next, an attempt should be made to drain the bronchial secretion by postural and bronchoscopic drainage for some weeks previous to the operation.

So far as the operation is concerned, two methods are open to us for consideration:—

1. *Cautery pneumonectomy* (Graham, 1925), applicable to chronic multilobar abscesses peripherally situated and practically confined to one lobe of the lung. The operative mortality of this procedure (11 to 20 per cent), which was at one time thought to be lower than lobectomy is not so now, as the operative mortality of the latter has been considerably brought down by recent improvements in technique (5 to 10 per cent).

2. *Lobectomy*, or the removal of an entire lobe of a lung. Edwards (1939) considers that patients between the ages of four and 40 years

(and exceptionally older) with bronchiectasis which is reasonably localized and infected and in whom there is no serious general contra-indication should be considered as candidates for radical excision of the portion of the lung affected'. But others seem to take a more cautious view. They are of the opinion that, in view of the fact that many patients who suffer from bronchiectasis for a long period do not suffer any disability from it, except cough and sputum and that they die of some inter-current disease, some definite disability, such as copious fœtid sputum and chronic ill-health from recurrent hæmoptysis, broncho-pneumonia or sepsis toxæmia must be present before such a serious operation as lobectomy is advised.

The operation of choice is the one-stage operation of Shenstone and Janes, preceded by 'pleural poudrage'. Edwards has recently published an excellent paper (1939) explaining this technique and the results of operation in 199 cases. He has shown that the earlier the age, i.e., the less chronic the disease, the less is the operative mortality. For example, in cases between four and 16 years there were no deaths in his series, between 16 and 20 years—9.5 per cent mortality, between 20 and 30 years—14 per cent, between 30 and 40 years—15 per cent and between 40 and 50 years—31 per cent. The successful post-operative management of a case is necessary to ensure a low operative mortality.

Conclusion

It has been shown that bronchiectasis is of fairly frequent occurrence in this country and that practically all types are met with. The authors believe that if a systematic search is made, as has been done in the present study, other provinces will be able to bring its frequent incidence to the surface. In the absence of an application of the proper diagnostic methods, many cases have in the past been wrongly diagnosed as pulmonary tuberculosis and have even been referred to sanatoria for treatment. It is hoped that such errors will become rarer and rarer as we progress with the study of this disease.

Due emphasis has been laid on the importance of prophylaxis and early detection of bronchiectasis, as it is a progressive disease not often amenable to palliative measures, and as the radical treatment carries definite risks and is only applicable to strictly unilateral cases.

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COLLAPSE THERAPY OF PULMONARY TUBERCULOSIS

REPORT ON A SECOND SERIES OF 205 THORACOPLASTY OPERATIONS ON 91 PATIENTS FROM THE WANLESS TUBERCULOSIS SANATORIUM, WANLESSWADI, DISTRICT SATARA

By W. M. G. JONES, B.Sc., M.D.
Medical Superintendent

Introduction

At a time when the collapse therapy of pulmonary tuberculosis is well standardized in all western clinics, it is strange that so little of it is being done in India. Almost every issue of the *American Review of Tuberculosis*, of *Tubercle* or of the *Journal of Thoracic Surgery* has one or more articles on the good and permanent results of this form of therapy. Perhaps these excellent journals need introduction to the sanatoria of India. On this subject no one need be uninformed for long, when there are such excellent books as for example, John Alexander's

wonderful book (1937)—*The Collapse Therapy of Pulmonary Tuberculosis*—to guide him. If this teaching is considered too 'radical' by some of the medical profession in India, it must be because they are unacquainted with the work of others such as O'Brien, Coryllos, Morriston Davies, Sauerbruch and the host of surgeons in this field who have demonstrated past all doubt that collapse therapy is the conservative way to treat pulmonary tuberculosis. It gives the best results, and the lowest mortality; it saves many who would die without its help, and restores a large proportion of them to work.

In this article from the Wanless Tuberculosis Sanatorium, we wish to put before the medical profession in India the results of our experience with collapse therapy in the treatment of pulmonary tuberculosis. These are not 'experiments' with a few cases, but the routine application of the methods outlined in Alexander's book to the patients in our institution. The Wanless Tuberculosis Sanatorium has 150 beds. Of the approximately 200 people treated for more than three months last year (1938) there were about—

70 treated by pneumothorax (and internal pneumolysis),
40 treated by phrenic operations,
70 treated by thoracoplasty or similar operations,
10 treated by miscellaneous surgical measures, and
10 treated by non-surgical methods.

200

We have the experience of treating some 800 cases by these methods during the past five years. As the principles of collapse therapy by thoracoplasty in the treatment of pulmonary tuberculosis are apparently not well understood in this country, we shall discuss briefly first our method of application of this treatment, and then give the results of the surgical work done during the past 1½ years. We wish to stress the use and value of thoracoplasty in the treatment of pulmonary tuberculosis as we find that this method of treatment is insufficiently used in India; hence a very large body of tuberculous patients, especially pneumothorax failures, are left untreated and eventually die of their disease. In surgical collapse, we have a simple, effectual and safe remedy.

The application of collapse therapy

All unilateral and bilateral tuberculosis, whether cavity or not, is first given a trial of pneumothorax, unilateral or bilateral. As shown above, in only 35 per cent of cases is induction of pneumothorax possible. Ideally we believe each case should be kept in bed until the cavity is closed and the blood examinations (the Schilling count and sedimentation test) return to normal, but often this is not practicable. In a very large proportion of pneumothorax cases adhesions prevent an efficient collapse and in these cases internal pneumolysis should not be delayed long. There are dangers both ways, however, as we have seen adhesions

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stretch and cavities close (where we had predicted this could not happen) and cavities have grown larger or caused spread of disease (where we thought there was no danger). Internal pneumolysis is generally such a small operation with so few complications and dangers that it is better to do it early. In this way a good 'selective collapse' (*i.e.*, a collapse that is best at the diseased area) is soon obtained. Thus complete abolition of the positive sputum is possible at an early date. This is, of course, the objective of the pneumothorax. The previously 'open' case (infectious to himself as well as to others) becomes a 'closed' case (infectious to no one) in a few months. With other workers in this field, we also deprecate the maintenance of a contra-selective collapse for long, for fear of contra-lateral spread and other complications, such as pleural effusion, etc. By this we do not mean to exclude a trial of several months of positive-pressure pneumothorax as this sometimes changes a poor pneumothorax into a good one.

Phrenic nerve paralysis is also of great value as a supplement to artificial pneumothorax where non-operable adhesions are preventing satisfactory collapse, as a stabilizer in successful pneumothorax to lengthen the refilling interval, and to provide a margin of safety for the patient in case the compression by pneumothorax be lost later.

When pneumothorax is found impossible, or though possible has failed to be 'selective' in type despite a fair trial, it is abandoned and then a phrenic nerve crushing is usually advised. The patient is also kept on strict bed rest, and these two measures give the lung a few months' time for absorption of exudative elements, disappearance of fever, gain in weight, and reduction in the size of the cavity or lesion if that is possible (*see plate XIX, case 3, a, b and c*).

We should note, however, that the mild 'relaxation' produced by diaphragmatic paralysis cannot benefit old chronic cases with much fibrosis, emphysema, or large cavities. These cases need no 'preparation' for thoracoplasty, but one must remember their chronicity in almost direct proportion diminishes the chances of successful collapse. It is for this reason that thoracoplasty used as a 'last resort' is likely to be a failure. Like all other methods of treatment it must be used in suitable cases and at the optimum time. But the postponement of major surgery in these pneumothorax failures, until exudative elements have absorbed and the case has become more 'stable', as well as afebrile, is a most important point, and has a great deal to do with a low percentage of post-operative reactions. Furthermore, a few cases will show such surprising improvement on this simple regime of rest that thoracoplasty may not be necessary.

It is frequently stated in the literature that benefit from phrenic surgery is proportional to

the amount of diaphragmatic rise. While there is truth in this statement, we believe that the most important element in the production of a good result is the character of the lesion itself. How often one sees a good effect and cavity closure when the diaphragmatic rise is hardly appreciable, or only moderate! In these cases it is very likely that the 'clearing' of the lesions, and contraction of cavities, is due to the intrinsic character of the lesion, which lacks fibrous elements and dense infiltration, and not entirely to the phrenic surgery. Indeed spontaneous improvement is also frequently seen in cases which have not had any surgery, and it is for this reason that diaphragmatic paralysis is only considered as a 'help' to the active treatment, namely, the rest in bed (*see plate XIX, case 1*).

Each one of these unilateral cases (and many of the bilateral ones too), especially those with definite cavitation, is a potential thoracoplasty case as soon as the pneumothorax is known to be a failure. Except in those cases where the rise of the diaphragm is great and/or the x-ray clearing unusual, diaphragmatic paralysis is not a satisfactory substitute for good selective collapse, which can be obtained so readily by pneumothorax or thoracoplasty. On the other hand, a few months of temporary diaphragmatic rest is most helpful in preparing these patients for thoracoplasty. Hence, in accord with the practice of most western clinics we use only a crushing of the phrenic nerve at this stage. In this way the patient secures a return of diaphragmatic function—and so of basal lung function—about the time that the collapse therapy is completed. If this is quite successful, the return of diaphragmatic function is welcomed. If a further six months' paralysis seems advisable, re-crushing is done. In bilateral cases with very low vital capacity further surgical collapse may occasionally have to await the return of diaphragmatic function. Likewise an excessive diaphragmatic rise may produce dyspnoea. A permanent phrenic interruption (by avulsion of the nerve) carries this danger, that it may disable the patient without accomplishing cavity closure. These cases are hopeless when cross infection in the good lung occurs. Avulsions should be limited to basal cases; or used only when the case is quite stable and cross infection unlikely.

In bilateral cases there need be no hesitation in controlling the area of fresh disease on the good side with a small selective pneumothorax. In our series, a number of such cases have gone through repeated thoracoplasties on the other side without a spread of disease or untoward reactions. In bilateral cases, when bilateral pneumothorax fails, the decision as to which side should have a diaphragmatic paralysis (or whether both sides) may be very difficult. Usually the wisest decision is to leave both diaphragms alone. If the disease is restricted to both apices, a bilateral collapse may be possible.

In favourable cases (which means the great majority of treatable cases), three to five months after admission to the sanatorium either the pneumothorax is well established (with cavity closure and negative sputum) and the patient is out of danger himself and is no danger to his associates, or after phrenic crushing and strict rest in bed the lesion or cavity has shown a sufficient improvement to justify continuing this line of treatment; or the case is afebrile and sufficiently stabilized by rest in bed and temporary diaphragmatic paralysis for thoracoplasty. Naturally some cases are not ready for major surgery in such a short time, while others are ready sooner. Every case is decided on its own merits. The rule is to defer further surgery as long as the x-ray shows progressive clearing of exudative elements and/or there is steady reduction in the size of the lesion or of the cavity. The presence of fever is not an absolute contraindication to operation unless it indicates active disease in the lungs or abdomen; nevertheless, we do not like to have to operate on febrile cases who seldom do well. In general we may say that any afebrile case, chiefly or entirely unilateral, whose general condition is good, is a candidate for thoracoplasty; and the chances of obtaining a good result by this means are above 75 per cent, and of returning to work about 50 per cent.

Doctors in charge of other sanatoria may say: 'We do not see many cases suitable for thoracoplasty'. But we maintain that *any* unilateral case of tuberculosis with positive sputum and open cavity is suitable for surgical collapse after pneumothorax (and phrenic interruption in certain cases) has failed to heal the lesion. These are the common cases we all see by the hundreds and that fill our wards and cottages. While the disease is unilateral collapse it, for when it becomes bilateral the dangers and difficulties are increased many times, if indeed cure is possible at all, *e.g.*, table A shows that the poor results in good and fairly good cases are 9 to 13 per cent, while in the poor cases (bad chronics) they are 53 per cent.

Dangers

But what are the dangers of a major operation like thoracoplasty on patients weakened by chronic disease? These are so small in experienced hands as to be almost negligible. Indeed, we have had as many 'spreads' of disease while waiting for surgery as we have had after surgery. To put it another way, the risk of the operation is about 5 per cent while the risks of disablement and death from untreated disease itself runs all the way up to 100 per cent! Witness the fact that of *all* sanatorium admissions more than 50 per cent are found to be absolutely hopeless. The statistics we are considering in this paper concern only the 50 per cent who remain for treatment*. Nevertheless, it is a

constant source of astonishment to us to see how much our chronically sick patients will stand. No, it is wrong to say 'how much', for one must never try to see 'how much' they will stand. Let us say 'how well' they stand a series of two or three thoracoplasty operations, but for good results these must be properly done and rightly spaced (*see* plate XIX, case 2).

Operation in stages

Thoracoplasty is major surgery, but not as some imagine it is. A few years ago thoracic surgeons attempted too much at one time with the result that most patients left the operating table in a state of considerable shock. Naturally the mortality was around 20 per cent and it took patients a long time to recover from the effects of such a big operation. One of the first thoracoplasties ever done was a removal at one sitting of all ribs from one side front and back, top to bottom! The patient lived and was exhibited everywhere. The ideal is to have little or no shock. To this end it has been found by vast experience that the operations must be done in multiple stages, two or two and a half ribs for each of the first two stages, and one or two ribs for the third stage. If more than this number are done the length of rib removed is reduced, and the next stage is an anterior approach (from the axilla or parasternal). Except in anterior stages, 10 per cent formalin is used on rib beds routinely to delay bone regeneration; it must be rubbed in well. Its omission will be regretted, as revision operations are far from easy and carry a higher mortality. All transverse processes except the first are also removed when increased collapse in the paravertebral area is desired.

The amount of rib removal necessary to secure adequate collapse of a lesion and closure of the cavity is a matter of experience, but in general the rule observed by all is to remove from above downward (*i.e.*, beginning with the first rib), all ribs which in the x-ray overlie the lesion, both front and back, *e.g.*, a cavity seen under the 4th and 5th ribs would require removal of 1 to 3 ribs in toto and the posterior halves of 4th to 7th. If the 7th rib is not included it is wise to trim off the end of the scapula so that the tip of this bone will not impinge on the 7th rib. This is a frequent cause of pain. Furthermore, collapse in the posterior half of the chest is much improved by having the scapula fit into the newly-made depression. The deformity produced by a good thoracoplasty is so little that when the clothes are worn the contour of the chest and shoulders is practically normal. Also the arm and shoulder regain complete function in nearly all cases.

The permanency of surgical collapse bothers some people. Will the compressed lung never function again? They overlook the fact that tuberculosis has already destroyed the function of the lung in the area involved, and where there is 'cavity' there is no lung tissue at all! When

*The Wanless Sanatorium receives all applicants for admission thereby keeping in its own hands the question of 'treatability'.

the reduction of lung function and destruction of lung tissue is minimal a temporary collapse is sufficient—and that we have in diaphragmatic paralysis or in pneumothorax, but even in these minimal cases, the collapse has to be maintained for 1 to 3 years to secure healing.

Notes on technique.—A first-stage thoracoplasty takes us a little over one hour from start to finish. This is somewhat longer than advocated by others, but apparently the patients suffer no harm thereby. Gentleness and good hæmostasis are of more value than speed. Ninety per cent of our major surgery is done by our staff doctors and not by one team or by one specialist as in western clinics. For anaesthesia we use morphine-atropine (or hyoscine), and ether-mixture under 10 pounds air pressure. (This new pressure etherizer is designed by Dr. C. M. Van-Allen and is manufactured by the N. Powell and Co., Bombay.) In this way even patients with a low vital capacity are assured of a good oxygen supply. This is a most important point in this kind of surgery. Some method of pressure anaesthesia is absolutely necessary, as, aside from the question of oxygen supply, a pressure system can overcome undue pulmonary 'flapping' when the lung is very mobile; prevent pulmonary collapse in the event of an open pneumothorax (from pleural tear, or in open pneumolysis); and last, but not the least, give the anaesthetist a positive means of controlling respiration (a pulmator in effect).

We have had five cases stop breathing on the operating table. All were resuscitated without touching the ribs merely by regulating the air pressure, and 'the operation completed as planned'.

We use a prone position on the operating table as it gives the lungs maximal freedom. The head is lowered about 15° to ensure drainage of sputum. Where the volume of daily expectoration is large, or in the presence of a bronchial fistula, local anaesthesia is to be preferred. In all weak patients saline is administered intravenously during the course of the operation. The surgeon must be prepared to remove fewer ribs than usual when the lung collapse is excessive; or to terminate the operation on the first sign of shock or falling blood pressure.

Post-operative care.—After operation the post-operative care is most important and the surgeon must be ready to attend the patient at all hours. Sufficient morphia to allay pain and permit cough, plenty (1,000 to 3,000 c.cm.) of intravenous fluids, tight bandages to prevent paradoxical motion, deep breathing (pressure breathing, viz, as employed during the 'pressure anaesthesia', to aerate the lungs and prevent atelectasis) when necessary, frequent expectoration and change of position, are the major points. The most important preventive measure is not to attempt too much on the operating table. The second and subsequent stages may be undertaken 3 to 6 weeks apart. After 8 weeks,

beginning fibrosis tends to limit the collapse even when formalin is used.

As the ordinary x-ray plate may not show up cavities buried in a partially-collapsed and atelectatic lung, it is an excellent practice to employ a double exposure technique for every x-ray taken after the first operative stage. (Some of our illustrations will demonstrate the results of this method, which gives the good side a normal exposure and the side operated upon an over-exposure.) A fresh x-ray must be taken before each operation, as it is indispensable in deciding the amount of rib to be removed, and noting the presence or absence of fresh areas of disease.

As soon as possible, after operation it is very essential that the patient be encouraged to learn to lie on the affected side with a small pillow tucked in the axilla; or to lie in a canvas sling on that side.

When the number of ribs required to secure adequate lung collapse have been removed (in 2 or 3 stages), the patient enters the second phase of his treatment, often the most trying, for it is *six months' strict rest in bed*. Some cases take *much more* than this. If the surgical collapse has been sufficiently well done, however, the patient is without symptoms, without fever, cough or sputum, and soon gains weight and strength. Frequently this does not begin until several months after the operations are completed, and healing is under way, but it does come if the disease is not too widespread in lung or abdomen; and provided that the effect of the operations has not been deleterious. Many a time, however, this is a trying period for both patient and surgeon for the long confinement to bed becomes irksome to many, as they do not understand the necessity for continued rest. Moreover, the collapse by x-ray may look satisfactory and no cavity may be visible, but the sputum may continue to be positive. The patient thinks, 'have I endured two or three operations in vain?'—the surgeon—'what should I do now?' Fortunately for both, in most instances nothing is necessary but continued bed-rest, and the sputum soon ceases entirely; but in a few cases another rib-resection, perhaps of anterior stumps, may be required. Bronchoscopy is revealing that many of the persistently-positive-sputum cases have tracheal lesions, but we have no experience along this line yet. In one case of posterior thoracoplasty we discovered a definite cavity under the sixth cartilage anteriorly. The sputum remained negative when this cavity was closed.

The reason why at least six months' bed rest is *strictly* enforced after collapse therapy is the evidence (from autopsies) that it takes at least six to eight months for a completely compressed tuberculous cavity to heal. Thereafter graduated walking exercises are carefully begun; and after another six months (one year after cavity closure by thoracoplasty) if all goes well, light

work may be permitted. The result of this conservative method of treatment is that very few well-collapsed cases relapse, in fact we can say, the relapses come almost entirely in those with a poor resistance, or incomplete collapse, or who have extensive disease in both lungs, or who refuse to follow advice and insist on a return to activity too soon. One of our cases with a good collapse at the right apex relapsed six months later after developing a sudden complete left basal atelectasis which produced such severe paradoxical breathing that he was extremely dyspnoeic for weeks. This state of affairs re-expanded the collapsed area, resulted in a relapse, and finally in death. Some of our early cases relapsed because we did not appreciate the necessity for complete cavity closure. Even a small 'innocent' cavity remnant may seed the whole lung in a few months.

Some cavities with rigid walls seem impossible to close by any means. Even the most extensive rib resection merely pushes the cavity into the yielding mediastinum, or (as in the Semb type thoracoplasty which completely immobilizes the lung apex) the cavity sinks down into the lung under protection of uncut lower ribs. Fortunately, these cases are not numerous. In a few such cases we have attempted closure of the residual cavity by plombage (paraffin filling) and have sometimes succeeded (see plate XIX, case 4). More frequently, no such extra-pleural space can be dissected. In that case external drainage is possible. In one of our first series we did this, with an ultimate good result.

Results of collapse surgery

To demonstrate what a large percentage of pneumothorax cases require adhesion cutting to secure selective collapse and negative sputum, our statistics show that out of approximately 110 pneumothorax cases in the past 18 months (June 1937 to January 1939) we have performed internal pneumolysis on 94 cases, as follows:—

17 cases where adhesions proved to be uncuttable,
36 cases whose adhesions could be partially severed,
and
41 cases whose adhesions could be entirely severed,
94

securing cavity closure in 47 of the 77 operable cases, or 61 per cent (method employed was thermal cautery). This means that 85 per cent of pneumothorax cases (about 30 per cent of all our cases) required an operation to make the pneumothorax effective.

Results of phrenic operations

A detailed study of our phrenic operations has not been made and therefore will not be reported on here. Two-thirds of all phrenic operations are done in connection with thoracoplasty or pneumothorax.

Thoracoplasty results

An earlier report (Jones, 1937) on 212 thoracoplasty operations on 110 patients showed 12.7 per cent dead, 25.5 per cent not improved or

worse, and 61.8 per cent benefited (21 cases improved, 16 very much improved and 26 apparently arrested; a total of 42 per cent much benefited). For comparison 2,642 thoracoplasty cases (unselected) reported by various thoracic surgeons in the West showed the following results:—

36-50 per cent	cured.
15-30	" improved.
14-25	" unimproved.
10-14	" dead.

Our results were encouraging to us, even if they did not appear very good on paper, for we were learning; and also we knew the tremendous risks we took in many of our cases. We never had an eye to statistics but offered surgery to any case if there seemed to be a chance of benefit. Frequently, the pressure to operate came from the relatives because 'operated cases get well quickly'.

At this time we are able to give a preliminary report on a further 205 thoracoplasties on 94 patients (covering the 1½-year period July 1937 to January 1939). Four patients took discharge against advice before the surgical work could be completed, reducing the report to 201 operations on 90 patients.

Dividing these into three groups—

Group I. Good	chronics	..	..	34 cases
" II. Slipping	"	..	..	24 "
" III. Bad	"	..	..	32 "
				90

The good results out of the whole 90 cases are 67 or 74.5 per cent. To show that these are not selected cases, 37 per cent (34 cases) of the 90 had bilateral pulmonary tuberculosis. Below we give a list of the complications found in the 32 patients in group 3 (the bad chronics).

Empyema	..	..	3 cases
Bilateral pulmonary disease	..	..	19 "
Abdominal tuberculosis	..	..	8 "
Huge cavities	..	..	3 "
Children	..	..	2 "
Bronchiectasis	..	..	2 "
Relapsed basal case (first series)	..	..	1 case

While in this worst group collapse therapy has given 47 per cent of good results, this group also contains 9 out of the 12 unimproved cases (or 75 per cent) and 8 out of the 11 deaths (73 per cent). If we consider only the 'good' and 'slipping' chronics the good results are 91 per cent and 87 per cent respectively, the worse unimproved 4 to 6 per cent and the dead 3 to 8 per cent.

It must be kept clearly in mind that these thoracoplasty results are on the pneumothorax and phrenic failures, very frequently cases that have been languishing 'quite incapacitated' for months on other 'treatment', or no treatment. The good pneumothorax and phrenic cases with a strong tendency to get well dropped out of this list at the beginning. Table A clearly demonstrates that failure to secure cure by either of these two simpler methods (pneumothorax and phrenic surgery) by no means materially lessens the chances of a cure by some other collapse

TABLE A

	GROUP I		GROUP II		GROUP III		ALL CASES	
	Good chronics		Slipping chronics		Bad chronics			
	Cases	Per cent	Cases	Per cent	Cases	Per cent	Cases	Per cent
Apparently arrested ..	29	85	12	50.0	10	31	51	56.7
Much improved ..	2	6	9*	37.5	5	16	16	17.8
Worse/unimproved ..	2	6	1	4.2	9	28	12	13.3
Dead ..	1	3	2	8.3	8	25	11	12.2
TOTAL ..	34	100	24	100.0	32	100	90	100.0

* Three of the nine still under treatment in the sanatorium.

Key.—‘Apparently arrested’ means without symptoms, in excellent condition, no or negative sputum, satisfactory x-ray, for a period of 4 to 6 months.

‘Much improved’ means without symptoms, in excellent condition, sputum may or may not be negative, x-ray may or may not show the source of the sputum, for a period of 4 to 6 months.

measure. Indeed, the ‘good chronics’ (which translated into our language now means ‘the good unilateral cases, as soon as pneumothorax is known to have failed’) have a far greater chance of cure by surgery than those ‘fortunate’ cases that ‘take pneumothorax’ for months on end! This is a bold statement! But many surgeons working in this field are coming to believe it. Statistics for foreign countries cannot be applied to India, yet even abroad with all facilities for proper maintenance of pneumothorax in every city, final statistics show only 40 per cent (some authors maintain only about 20 per cent) reach an actual cure. In India pneumothorax facilities are only just beginning. (We appreciate full well that this report of ours is a preliminary one as our cases have to remain well over a two-year period of time to attain a strict ‘cure’. We hope to report later on the ultimate results in these cases. To date, however, we know of no relapses among the apparently-arrested or much improved cases reported herewith.)

There were 10 early deaths and one late one. The causes of these early deaths are listed in table B.

Of the two cases dying directly as a result of operation, the exact cause of death is not known in one. The pleura was badly torn twice, one of these resulting in death. In two other cases, there was serious wound infection materially affecting the patient, but not resulting in death. These are included in the 13 per cent of the poor results. (Doubtless many or all of the 12 unimproved-worse group will die soon.)

In addition to thoracoplasty, other forms of collapse therapy are reserved for special cases. The reason for caution in their use is that each of these other methods carries some additional risk. Paraffin plombage, we have done 30 times with excellent results in about half the cases. The paraffin itself has caused us no trouble but twice an extensive hæmorrhage necessitated removal

of the filling; and in other cases cavity closure was not secured. The reason for this is obscure as the apex is well immobilized and compressed. Curiously also the ‘Semb type’ theracoplasty

TABLE B

Cause of death after thoracoplasty operation in this series

Deaths not due to the operation.	Tuberculosis empyema cases ..	2	7.7 per cent
	Contra-lateral spontaneous pneumothorax ..	1	
	Massive atelectasis of contra-lateral base; 6 months after operation ..	1	
	Progressive abdominal tuberculosis ..	3	
Deaths due to the operation.	Post-operative wound infection ..	1	4.4 per cent
	Death due to operation ..	2	
	Contra-lateral spread of disease ..	1	
Cases ..		11	12.1 per cent

operation which also immobilized the apex secures the same criticism, viz, migration of the cavity caudad. This operation is unnecessary for routine use, but may be reserved for certain cases with large cavities or very medially-placed ones. Lately, another variety of the same procedure has been advocated—extra-pleural pneumothorax. We have done seven such cases recently with very good results in five. One needs much experience however to give a correct judgment. Western phthisiologists are still in disagreement over the proper use of these special collapse measures. Thoracoplasty on the other hand is well standardized, its technique simple, and its results good. Our direct operative mortality of 4.4 per cent should have been less as two of the four deaths might perhaps have been avoided with greater care and skill.

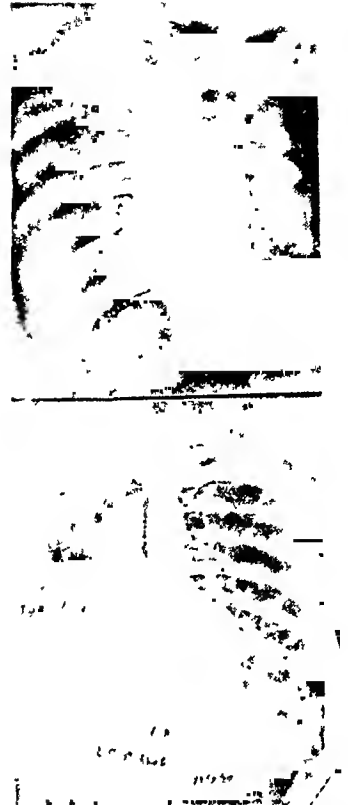
PLATE XIX



Case 1



Case 2.



Case 4.



a

b

c

Case 3.

Collapse Therapy of Pulmonary Tuberculosis. Jones.

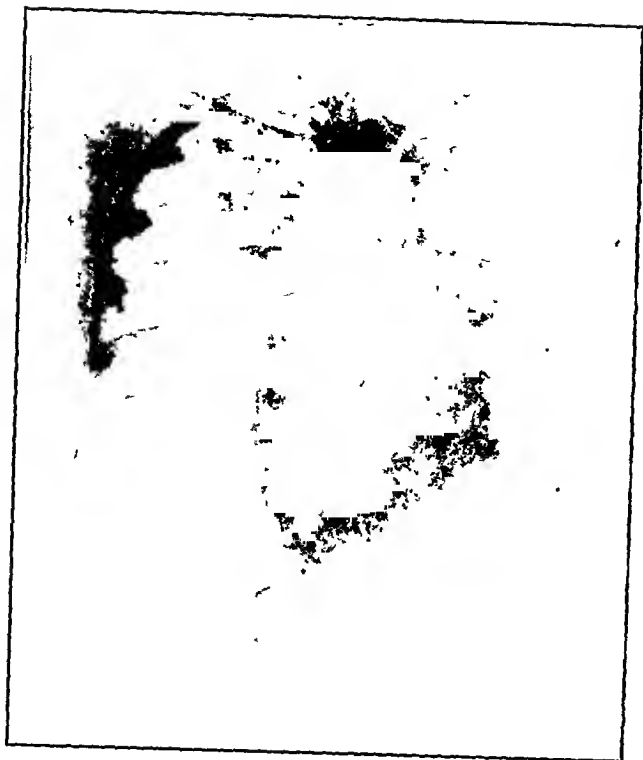


Fig. 1.—Mediastinal hernia after artificial pneumothorax. Note the curved shadow on the left side just beyond the aortic shadow.



Fig. 2.—Tomograph of the same case showing that the hernia is in the anterior mediastinum.

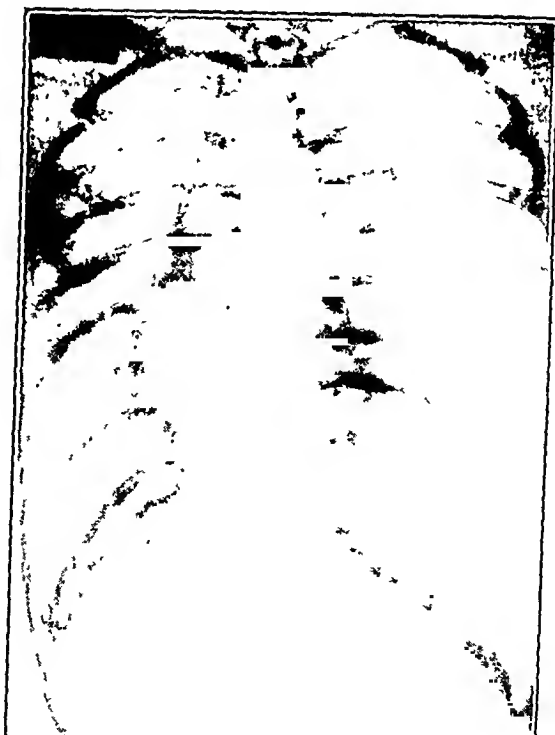


Fig. 3.—Spontaneous pneumothorax complicating artificial pneumothorax producing marked displacement of the mediastinum.
Complications during Artificial Pneumothorax Therapy: Viswanathan

Conclusion

(1) Collapse therapy of pulmonary tuberculosis needs to be known and used in India more than it is at present. Its risks are small while it offers excellent chances of cure to that large group of cases that cannot benefit by pneumothorax or phrenic surgery. While its application is chiefly to unilateral cases, it can be used in conjunction with contra-lateral pneumothorax and phrenic interruption in many bilateral ones as well. For most if not all chronic cases collapse therapy offers the shortest road to cure, while a good proportion can be rehabilitated for work.

Appendix

Case 1.—R. S. Admitted in November 1937, extensive bilateral apical infiltrations, with a large cavity on each side (x-ray, upper). Bilateral pneumothorax failed. Left thoracoplasty done in 4 stages, February to July 1938. Concurrently with left cavity closure the right cavity also closed spontaneously, with complete clearing of the infiltration (x-ray, lower). Sputum became persistently negative in August 1938. Patient discharged from the sanatorium in good general condition, practically no cough, and excellent blood reports 10½ months after admission; classification 'apparently arrested'.

Case 2.—E. M. Admitted October 1936, with extensive disease in the whole left lung, multiple cavities at the apex, and a very badly damaged right lung as well. She was judged to be a more-or-less hopeless case, but insisted on staying for treatment (x-ray, upper). Both pneumothorax and internal pneumolysis failed to close the apical cavities. Two stage thoracoplasty done in April 1938, and the sputum became persistently negative in October, five months later. A severe wound infection delayed recovery for several months. The right side gradually cleared (x-ray, lower). Patient left the sanatorium without symptoms or sputum in March 1939. A complicating intestinal tuberculosis prevented any gain in weight.

Case 3.—Mrs. C. P. First admission in 1937. She spent 8 months in the sanatorium and was discharged with a satisfactory pneumothorax on the left side. Readmission 5½ months later with the pneumothorax space lost, the disease active, and x-ray evidence of beginning infiltration at the left hilum (x-ray a). Right phrenic nerve crushed in May 1937, resulting in an excellent contraction of the diseased upper lobe, but the sputum remained positive (x-ray b). Two stage thoracoplasty in August (x-ray c). Sputum became negative immediately. Weight gain 43 lb. Discharged 'apparently arrested' in March 1939 after a stay of 11 months.

Case 4.—D. S. G. Admitted in January 1938 with a contra-selective right pneumothorax, and active disease in the left lung (x-ray, upper). The pneumothorax was abandoned and the right phrenic nerve was crushed, but without any apparent benefit. Three stage thoracoplasty completed by the end of April, but the cavity only migrated into the mediastinum, and the sputum remained positive. Paraffin plumbage done towards the end of July with successful closure of the cavity (x-ray, lower, the paraffin does not show, but is evidenced by the prominence of the regenerated ribs just below the clavicle). Sputum became persistently negative in September. Discharged in October, a little too early for 'apparently arrested' classification, but his subsequent recovery has been uneventful. Weight gain 18 lb.

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COMPLICATIONS DURING ARTIFICIAL PNEUMOTHORAX THERAPY

By R. VISWANATHAN, B.A., M.D., M.R.C.P. (Lond.),
T.D.D. (Wales)

Lecturer in Tuberculosis, Medical College, and
Medical Officer in charge of Tuberculosis Department,
Vizagapatam

THERE is no gainsaying the fact that artificial pneumothorax is the most potent weapon in the armamentarium of the phthisiologist, but, as in the case of other therapeutic measures, pneumothorax also is likely to be abused by enterprising young physicians who are liable to use it in season and out of season, and thereby bring this excellent instrument into undeserved disrepute. The writer was told by a touring medical officer, of how a doctor in a mofussil station boasted that he had induced pneumothorax in several cases without examining the patients radiographically, either before or after induction. Now that a great impetus is given to the problem of tuberculosis in this country there is every possibility of increasing the incidence of similar therapeutic adventures which are undoubtedly beset with positive danger. Hence a statistical study of the complications and dangers of pneumothorax therapy is justified at the present juncture. Woodcock (1915) wrote, 'there are dangers in connection with the production of artificial pneumothorax, but the greatest and about this there be no mistake is the neglect in which it is held'.

In a series of three hundred patients on whom pneumothorax was attempted, the complications* that occurred during primary induction and subsequent course of treatment are given as follows :—

Pleural effusion	106
Pain—severe .. 5½	22
" —slight .. 17½	
Surgical emphysema	16
Marked mediastinal displacement ..	15
Mediastinal hernia	12
Spontaneous pneumothorax	7
Dyspnoea	6
Obliterative pleurisy	5
Pleural shock	1
Puncture of big blood vessels (including the heart)	1

Gas embolism.—This is a very serious complication often causing sudden death, though fortunately extremely rare; though I have not met with a single case, a number have been reported in the literature. Air may enter the pulmonary veins and if the coronary vessel is occluded by bubbles sudden death is likely to occur. Convulsions, unconsciousness, transient blindness, local blanching of the skin, hemiparesis and transient paralysis are some of the symptoms liable to occur, depending upon the situation of the air embolus. Air might enter the circulation without causing any kind of untoward symptoms whatsoever.

* Gas embolism, sepsis and pneumo-peritonium did not occur.

Pleural shock.—This is an equally rare but equally dangerous catastrophe. Some writers have denied the existence of shock, claiming that the symptoms are due to embolism. There is no doubt that the symptoms are often similar in both conditions. The shock which occurred in the one case in the present series was comparatively mild. It happened just when the needle was taken out after a successful primary induction. The patient suddenly became unconscious with mild convulsive movements all over the body; the pulse became thready and feeble; the head was immediately lowered, and the patient regained consciousness in a minute. In one of Burrell's (1937) cases the patient gave a few gasps and died immediately after the needle was withdrawn.

Pain.—Provided local anæsthesia is perfect, the passage of the needle through the chest wall and the puncture of the pleura ought to be painless. In most cases the introduction of air causes varying amounts of discomfort, but actual pain in a severe form occurs particularly when there are extensive adhesions. Such severe pain occurred in cases lasting for a day or two. Severe pain occurred in five cases lasting for a day or two. Slight pain was complained of in 17 cases. A few patients with bands of adhesions have complained of a dragging pain in the chest, whenever the refills produced positive pressure.

Puncture of big blood vessels (including the heart).—This accident occurred in one patient with left-sided fibro-caseous disease with marked shrinking of the lung, and consequent displacement of the heart to the left. As soon as the needle was introduced blood rushed into the tube. The needle was immediately withdrawn and nothing untoward happened.

Dyspnœa.—That many patients complain of slight shortness of breath during pneumothorax treatment, stands to reason because the vital capacity of the lung is definitely diminished after any form of collapse therapy. It is surprising, however, how much collapse in both the lungs may occur with little or no dyspnœa.

Sudden severe dyspnœa might occur as a result of spontaneous pneumothorax being superimposed on artificial pneumothorax. High positive pressure in the pleural cavity or marked mediastinal displacement or mediastinal hernia may cause dyspnœa in some cases. In six cases of the series, dyspnœa occurred after every refill and was sufficiently severe to necessitate abandonment of pneumothorax altogether.

Sepsis.—Ordinary septic precautions ought to be enough to prevent any form of sepsis.

Surgical emphysema.—Escape of air into the chest wall through the puncture made in the parietal pleura is liable to occur, particularly after primary induction, as the stimulation to cough is greatest at that time. More so will be the case in patients already suffering from a severe cough. There is no harm in this complication as the air gets absorbed in a

few days. In one patient severe subcutaneous emphysema extending over the chest, neck and even the upper extremity occurred after a successful intrapleural pneumolysis. Radiographic examination the next day showed complete expansion of the lung. Emphysema however disappeared in 15 days.

Pneumo-peritonium.—This accident is possible when there is a high diaphragm or when the puncture is made too low. In no case did this happen in the present series. One patient, who attended the writer's department for refills after discharge from another hospital, said that during the last refill in that hospital no change in the manometric reading was found even after 800 c.cm. of air were put in, but she felt as if the upper abdomen was becoming bloated. The abdominal discomfort lasted for a few days. This was evidently a case of accidental pneumo-peritoneum.

Spontaneous pneumothorax.—During pneumothorax treatment more air might get into the pleural cavity directly from the lung, either as a result of laceration of the visceral pleura by the needle or as a result of a superficial lesion or cavity breaking through, after the pleural layers are separated, or due to rupture of an adhesion at its point of attachment to the lung and consequent laceration of the subjacent pulmonary parenchyma. Spontaneous pneumothorax occurred in seven patients in the present series. In one case the accident happened after the third refill. Two hours after the refill the patient complained of severe pain and dyspnœa. Examination revealed marked displacement of the heart to the opposite side. Spontaneous pneumothorax was diagnosed and 800 c.cm. of air were aspirated leaving the manometric reading at $-7 -2$. In three hours' time his dyspnœa became worse and a valvular type of spontaneous rupture was diagnosed and a continuous drainage was put in. Pyo-pneumothorax occurred after the seventh refill. Even though pyo-pneumothorax resulted the patient lived for another year. In the first case the complication was due to rupture of a superficial cavity, while in the second case it must have resulted from the rupture of an adhesion. Nothing untoward happened in the remaining five cases, evidently on account of spontaneous closure of the openings in the lung.

Mediastinal hernia.—There are three weak spots in the mediastinum, in which only loose connective tissue separates the parietal pleura of the two sides. They are (1) in the anterior mediastinum behind the sternum, extending from the first to the third rib, (2) in the lower posterior mediastinum between the aorta posteriorly and œsophagus anteriorly, and (3) in the upper posterior mediastinum between the vertebræ posteriorly and œsophagus anteriorly. Mediastinal herniæ have been observed in each of these three places during the course of pneumothorax treatment. This subject has been well presented by Packard (1927), Doub and Jones (1937),

and others. Herniation occurred in 12 cases in the present series. The diagnosis was made only by radiographical examination as no untoward symptoms were noticed pertaining to this complication. Only one patient, in whom positive pressure was produced during a refill, complained of substernal pain and slight dyspnoea. The symptoms disappeared after two days, evidently because of absorption of air and consequent lowering of pressure in the pleural cavity, resulting in the disappearance of the hernia.

Marked mediastinal displacement.—In 15 cases the mediastinum was found to be markedly displaced even though negative pressure was maintained in the pleural cavity. Most of the cases were young adults who had either early or moderate lesions. In the majority of cases of chronic phthisis the mediastinum gets fixed probably on account of mediastinal pleuritis, but in some cases it is very mobile, and hence gets displaced even when the intrapleural pressure is negative. No untoward symptoms were noticed consequent on mediastinal displacement in these 15 cases, in whom the treatment was pursued successfully.

Pleural effusion.—Effusion during pneumothorax treatment has been the subject of extensive study by various writers. The incidence of effusion given by different people varies from 35 per cent to 90 per cent. In Burrell's (1937) 309 cases effusion developed in 128. Nicklas *et al.* (1937) assess the incidence at 67.5 per cent. In the present series out of the 204 cases in which the treatment was successfully continued, 106 developed effusion of varying degree, giving a percentage of 49.3. Massive effusion occurred in seven cases. The effusion turned out to be purulent in four cases two of them being the result of spontaneous pneumothorax. In some cases the onset of effusion is accompanied by constitutional disturbances such as a rise in temperature, acceleration of the pulse and loss of weight. Nicklas *et al.* (1937) divide effusions into hot effusions and cold effusions according as they are associated with febrile reaction or not.

Pleural effusion is the most common complication of artificial pneumothorax. Various explanations have been offered for its frequency; repeated trauma of the parietal pleura, irritation by the gas which acts as a foreign body, and interpleural pressure are a few of the theories. Pisani and Smejkal (1934) consider that effusion is due to the increased permeability of the capillaries from want of oxygen, to increased osmosis, to high concentration of hydrogen ions, to calcium deficiency, and, lastly, to the aspirating effect of a negative pressure. Whatever be the cause of the effusion it does not affect the prognosis adversely in the vast majority of cases. Purulent effusions are really dangerous. Obliterative pleuritis which might result from effusion in some cases will prevent further continuance of pneumothorax treatment.

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THE COMPARATIVE VALUE OF DIFFERENT GOLD PREPARATIONS IN THE TREATMENT OF PULMONARY TUBERCULOSIS

By Y. G. SHRIKHANDE, B.Sc., M.B., B.S., T.D.D. (Wales)
Medical Superintendent, King Edward VII Sanatorium,
Bhowali, U. P.

GOLD has been used in the treatment of tuberculosis from time immemorial. Reference to it is found in the Vedas and the two great physicians, Charak and Sushruta, have advocated its use in their books. Even to-day, it is used by Ayurvedic physicians in different forms. The introduction of gold in the treatment of tuberculosis according to the western system of medicine may, however, be said to date from the time of Koch's investigations on the tubercle bacillus.

Until about the year 1916, experiments with gold were carried out with inorganic compounds. Attempts were later made to prepare effective organic compounds and the first to be prepared by Adolf Feldt was aurocantan. Certain disagreeable complications were, however, produced by it in a number of cases and this was attributed to the combination of gold with the cyanide group. Another compound was therefore prepared under the name krysolgan in which the metal was attached to the amino group. Krysolgan was followed by other preparations like solganal, solganal-B, lopion, etc.

While a good deal of literature continues to appear in the medical press for and against the use of gold, the fact that it is still being employed in several countries after a trial of many years is sufficient reason for believing in its efficacy in suitable cases, and it would not be considered unreasonable to say that gold as a

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Obliterative pleuritis.—This complication might arise in the form of insidious and inexorable chronic dry pleurisy or as a result of pleural effusion, during the course of its absorption. In the present series, it occurred in five cases within six months after primary induction. This obliterative process is desirable at the termination of treatment by pneumothorax, but, if it happens during the course of active treatment, pneumothorax will have perforce to be abandoned.

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remedy has come to stay in the treatment of pulmonary tuberculosis.

During recent years the market has been flooded with a variety of gold preparations and the medical man in general practice naturally finds it difficult to decide which preparation is most suitable or safe for use, and our opinion has on several occasions been sought for guidance.

Roughly speaking the different preparations of gold may be divided into three groups :—

- (1) Compounds soluble in water.
- (2) Compounds soluble in oil.
- (3) Insoluble compounds in oily suspension.

While it is true that many preparations have been placed on the market as a business proposition, in the case of some of the important ones an attempt has been made to reduce their toxic effects and increase their therapeutic value.

We have had the opportunity of using various gold preparations, such as krysolgan, triphal, lopion, sanocrysin, solganal, solganal-B, crisalbine, lypocrysol, myocrysin, oleo-sanocrysin, auro-protasin, solganal-B oleosum, etc. Sanocrysin and crisalbine are the same compound of sodium thiosulphate prepared by two firms under different names. Recently an oily suspension of a gold compound called 'K. G. 23' was sent to us for trial by the Indian Institute of Science at Bangalore.

Since 1926, nearly 1,000 cases of pulmonary tuberculosis have been treated in the sanatorium with the different preparations of gold and experience has shown that the choice at the present moment lies between sanocrysin and solganal. The former is an inorganic compound prepared by Möllgaard of Denmark and the latter is an inorganic compound prepared by Feldt of Germany.

The treatment of several cases with sanocrysin and solganal had left an impression in our minds that solganal was a much safer preparation, because while it produced equally good, if not better results, the complications with it were much less marked and much less dangerous.

Recently, however, I had the opportunity of reading the views of Frimodt-Möller and Barton (1938) on the comparative merits of sanocrysin and solganal and their opinion that 'sanocrysin had a much better therapeutic effect than solganal, while there is very little difference between the drugs as regards dangerous complication' set me thinking and I, therefore, wanted to make sure if our opinion about the two drugs, mentioned above, was correct.

Sanocrysin has been used in the sanatorium since 1926 and solganal was introduced for the first time in 1931. On going through the reports for 1931 and subsequent years it was found that sanocrysin was gradually being replaced by

solganal as will be evident from the following figures :—

Year	SANOCRYSIN		SOLGANAL ¹	
	Sanocrysin	Oleo-sanocrysin	Solganal	Solganal-B oleosum
1931 ..	17	..	23	..
1932 ..	28	..	17	..
1933 ..	35	..	6	21
1934 ..	1	8	..	47
1935 ..	..	10	..	52
1936 ..	..	..	..	88

For the purposes of this article, however, the cases treated during the year 1933 have been studied in detail and the conclusion has been drawn from them. The indications for treatment were the same whether the preparation used was sanocrysin or solganal, and no attempt was made to select patients for treatment with a particular preparation. Only those cases which received more than two injections have been taken into consideration.

Thirty-three cases were treated with sanocrysin and 20 cases with solganal and they were spread in the three stages of Turban-Gerhardt classification as follows :—

Stages	SANOCRYSIN		SOLGANAL	
	Number	Per cent	Number	Per cent
T1 ..	10	30.3	8	40
T2 ..	10	30.3	8	40
T3 ..	23	69.9	12	60

In judging the results of treatment in the two groups the following factors were taken into consideration :—

- (1) Effect on temperature.
- (2) Effect on weight.
- (3) Effect on tubercle bacilli.
- (4) Effect on blood sedimentation rate.
- (5) Effect on skiagrams.
- (6) Final results of treatment.

Temperature.—Considering negatively, the temperature was found to have increased in four cases of the sanocrysin group and in three cases of the solganal group. In the remaining cases of the two groups the result was equally good. A difference of one degree or more was taken into consideration in judging the effect on temperature.

Weight.—Of the 33 cases treated with sanocrysin, 25 gained in weight and there was loss in eight patients. In the group treated with solganal, 17 patients gained and three patients lost in weight.

The maximum gain in a patient treated with sanocrysin was 33 pounds and the maximum loss was 21 pounds, while the maximum gain in

a patient treated with solganal was 40 pounds and the maximum loss was 8 pounds only.

Tubercle bacilli.—The effect on the tubercle bacilli at the time of discharge of the patients from the sanatorium was as follows in the two groups :—

	SANOCRY SIN		SOLGANAL	
	Positive	Negative	Positive	Negative
Before treatment.	31	2	17	3
After treatment.	25	8	9	11

It will be clear from the above table that the effect on tubercle bacilli was better marked in the case of solganal than in the case of sanocrysin.

Blood Sedimentation Rate.—In the sanocrysin group the blood sedimentation rate was found to have improved (decreased) in 25 cases and had become worse (increased) in eight cases. In the solganal group, it had improved in all the cases; the Westergren method was employed.

X-ray evidence.—Not much difference was noted in the x-ray evidence of the patients treated with the two preparations. The effect was similar in the two groups.

Results of treatment.—The results at the time of discharge were found to be as follows in the two groups :—

Results	Sanocrysin	Solganal
Arrested	3	3
Much improved	9	8
Improved	11	5
Stationary	4	2
Worse	6	2
TOTAL ..	33	20

It will be evident from the study of the above tables that the therapeutic results obtained from solganal were more satisfactory than those obtained from sanocrysin.

Reactions from sanocrysin and solganal.—We shall now consider the reactions produced by the two preparations. The observation column of the patients' charts was studied from day to day and it was found that while the reactions were of mild nature in the group treated with solganal, they were of sufficient severity in the sanocrysin group. Only four cases of the solganal group were found to have suffered from body-ache and gastro-intestinal disturbances but in the sanocrysin group 26 patients suffered from these and other reactions.

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PNEUMONOCOONIOSIS WITH SPECIAL REFERENCE TO SILICOSIS, ANTHRACOSIS AND TUBERCULOSIS

By P. K. SEN, M.B. (Cal.), M.D. (Berlin),
T.B.D. (Wales), Ph.D. (Wales)

Industrial Tuberculosis Research Worker, Tuberculosis Enquiry, I. R. F. A., All-India Institute of Hygiene and Public Health, Calcutta

THE scope of this paper will be limited to the consideration of silicosis and anthracosis, the pathological conditions of the lung produced by the inhalation of silica and coal-dust, respectively, and their relationship to tuberculosis. A

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Oily preparations of gold.—If the table showing the number of patients treated with sanocrysin and solganal during the years 1931–1936 is studied, it will be noticed that the number treated with the oily preparations has increased every year with the result that by the years 1935 and 1936 the oily preparations had completely replaced the watery solutions. Practical experience has shown that the oily preparations are preferable to watery solutions for the following reasons :—

(1) The oily preparations can be administered without any difficulty. It has been found difficult at times to inject aqueous solutions in patients with poor veins.

(2) Absorption of gold takes place slowly.

(3) Prolonged action is obtained. This is not so in the case of aqueous solutions which are excreted more rapidly.

(4) Reactions and toxic effects are reduced to a minimum.

The fact that oleo-sanocrysin had later to be placed on the market is evidence of the importance of oily preparations of gold. Solganal-B oleosum is preferred by us because, while being less toxic than oleo-sanocrysin, it has given equally satisfactory results. It has also been found that oleo-sanocrysin is more painful at the site of injection than solganal-B oleosum.

Conclusion

Our experience at the King Edward VII Sanatorium at Bhowali has shown that solganal is a safer preparation than sanocrysin in the treatment of pulmonary tuberculosis. While the results obtained from solganal are equally, if not more satisfactory, the complications from it are much less marked and much less dangerous than from sanocrysin. The oily preparations of gold are preferable because prolonged action is obtained from their use and the toxic effects are reduced to a minimum. Solganal-B oleosum has been found in our experience to be less toxic and less painful than oleo-sanocrysin.

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large amount of work has been done in other countries on dust inhalation and its harmful effects. Such work becomes more and more important as a country marches progressively towards industrialization. Many of the modern industries, in the process of their workings, produce clouds of dust which float in the air and are inhaled by the workers during the whole time of the working shift. It is, therefore, easy to realize that such intensive dust inhalation may produce pathological conditions in the lung.

Ordinary atmosphere, specially of the cities, also contains dust and everyone inhales dust; but no harm results, as the lungs can get rid of a certain amount of dust. Coarse dusts are generally caught by the ciliated processes of the mucous membrane of the respiratory tract and thrown out by the wave-like movements. Finer dusts enter the deeper parts of the respiratory tract, are engulfed by the alveolar phagocytes, removed to the nearest lymphatic, and are thence eliminated through the lymphatic system. But there is a limit to this capacity for elimination. If by any means the intake exceeds this limit of elimination the result will be an accumulation of dust. This accumulation, if it occurs to any great extent, is likely to cause damage to the system. The nature and amount of damage depend, largely, on the nature and amount of dust inhaled. This is why a consideration of dusts specially encountered in the industrial processes is included here.

Dusts

Prof. Cummins (1935) classifies the dusts into two categories :—

(A) Chemically-active dusts.

(B) Inert dusts.

Of these two types the chemically-active dusts are by far the most important and their presence in any industry must be carefully investigated.

(A) Chemically-active dust

These dusts are soluble in tissue fluid. Of all the dusts in this group, silica-containing ones are the most dangerous. Silica is a tissue poison and produces in the tissue both degenerative and sclerotic reactions. Minute particles of silica dust enter the deeper parts of the respiratory tract during inhalation. These particles are then engulfed by the alveolar phagocytes and carried to the nearest 'lymphatic mass' situated near the terminal bronchioles. Mavrogordato (1922, 1926) thinks that the poisonous action of the silica kills and then mummifies the phagocytes. These later disintegrate in their turn, and the liberated particles are in all probability taken up by other phagocytic cells, so that the process continues. After a time the particles are dissolved and produce the reaction of fibrosis and degeneration. According to King and Dolan (1934), on the other hand, the particles do not linger in the cells for a long time. They soon dissolve and produce the reaction of fibrosis,

that is, silicotic nodule formation. The nodules themselves show almost invariably zones of necrosis at the centre. This central necrosis may be due to high silica concentration at the centre, or to a lack of nutrition here. However this may be, these central necrosed areas eventually become fibrosed. The central necrosis, the surrounding zone of fibrous tissue, and the gradual replacement of the necrotic area by fibrous tissue fibrils, make silicosis almost an identical process, histologically, with the healing stage of tuberculosis.

There are some differences of opinion as to how the silicotic nodules of fibrous tissue are produced. One school believe in the 'mechanical theory'. They think that silica particles act as foreign bodies in the lung tissue without going into solution and just like other foreign-bodies produce a fibrotic reaction. As the particles, carried by the phagocytes, conglomerate in the lymphatic masses, fibrosis occurs round and inside these areas giving them a nodular appearance. But the international silicosis conference at Johannesburg (Irvine *et al.*, 1930) came to the conclusion that the lesions produced in silicosis were due to the solution of silica particles in the tissue fluid and not to any mechanical action. Thus, the solution theory has been accepted as correct to-day.

The reaction to silica particles in the tissue depends on various factors. Chief amongst them are, (i) the chemical composition, (ii) the concentration of silicious material in the atmosphere and in the tissue, and (iii) the size of the dust particles. The following are some of the considerations about each of these factors :—

(i) *The chemical composition.*—It was originally supposed that only free silica was responsible for the production of silicosis, because in experimental animals quartz (free silica) particles produced lesions which were essentially the same as in human silicosis. But Jones (1933) claimed that a fibrous silicate, called *sericite* (a hydrous silicate of aluminum and potassium) was a potent cause of silicosis. During his investigations he found that wherever there was silicosis there was *sericite* as well. Where there was no *sericite* but other silicious materials present, there was no silicosis. Secondly, he found that the bulk of the mineral residue after nitric acid treatment of every silicotic lung specimen consisted of *sericite*. It was for these reasons that he came to the above conclusion. But Watkins, Pichford and Meir, on the other hand, according to Cooke (1935) in a much earlier investigation, concluded 'that the mineral contents of Rand silicotic lungs were identical, physically, chemically and in the numerical ratios of the particles of quartz to that of particles of accessory polarizing mineral, with the finer portions of Rand mine dust. Quartz particles were, of course, by far the most numerous. They add that there was no indication of the physiological selections of particles

except in regard to size'. Robson, Irwin and King (1934) could produce early silicosis in their experimental animals with quartz and dilute gas but they failed to produce such lesions by sericite and gas. Gardner (1934) also found that 'Uncombined silica causes a very rapid necrosis of tissues, which is not produced by silicates and non-silicious dusts'.

Even if we take for granted that the bulk of the residue after nitric acid treatment of silicotic lung specimens consists of sericite, that does not necessarily mean that sericite is the cause of silicosis. It is possible that sericite is retained in the lung as a non-soluble or less soluble residue, whereas some other form of silica being more soluble in the tissue fluid, vanishes from the tissue, and is the real cause of fibrosis. Of course this argument only holds good if we accept 'solution theory' to be correct. Recent work of R. King seems to prove that silica, though otherwise an extremely insoluble mineral, dissolves in tissue fluid. The International Silicosis Conference in 1930 accepted the 'solution theory'. The problem then is: Is free silica more or less soluble than silicates? Jones suggested, according to Cummins (1935) in his original publication (Jones, 1933), 'that sericite mineral is less stable and its particles, because of their physical form, expose far greater surface to volume for any chemical action than do the more compact grains of quartz'. Therefore sericite is more soluble. But this has not yet been confirmed, nor has it been universally accepted. Efforts have been made to find out the solubility of quartz and sericite *in vitro*. Titus (1937) studied the solubility in distilled water and serum, and could not find any difference in their solubility *in vitro*. However this may be, the fact seems to be that the solubility of the particular dust in the tissue fluid, which depends on its chemical composition, may be one of the important factors in the production of silicosis.

The record of work done on this aspect seems to show that free silica is mainly responsible for the production of silicosis. The effect of silicates, except asbestos (asbestosis is a different condition), is rather doubtful. If they have any it seems to be less important.

Middleton (1936) gives the following figures regarding the death rate from silicosis in silica and silicate industries in England and Wales:—

Processes involving exposure to silica dust—

(1) Sandblasting ..	6.4 per 1,000 living
(2) Refractories industry ..	3.0 " 1,000 "
(3) Sandstone industry ..	3.0 " 1,000 "
(4) Gold and tin mining ..	11.0 " 1,000 "
(5) In 'flint and pebble crushing', 'manufacture of abrasive soaps', 'polishing and grinding', 'granite and slate industries', 'coal mining' and 'pottery industries'.	Actual data not given but is stated to be 'high'.

Processes involving exposure to dust of silicates:

- (1) Asbestos (causes generalized fibrosis)—High death rate.
- (2) Sillimanite, kaolin, talc, French chalk, mica (causes mild fibrosis)—Not highly dangerous.

(ii) *Concentration*.—There is experimental evidence to show that the nature of damage of tissue by silica depends on the concentration of the mineral in solution. Gye and Purdy (1922 and 1924) showed that silica in colloidal form was a cell poison. When injected intravenously in a concentrated form, it caused death by degeneration and necrosis; but, in a dilute form, it caused proliferation of connective tissues. The 'solution theory' of silicosis, first suggested by Collis, was supported by this experiment. Tissue fluid dissolves silica very slowly and the liberation of colloidal silica in minute quantities probably causes the proliferative reaction. The result is fibrosis of the lungs.

It is easy to understand that the higher the concentration of silica dusts in the working atmosphere, the greater would be the chance of a high concentration of the mineral in the lung tissue. According to Cummings (1934) if the concentration of silica dust does not exceed 5,000,000 particles per cubic foot of air, as determined by a light field counting method, a normal man may work in this atmosphere unimpaired in health. This now raises important considerations, and, if confirmed, may be of use in establishing a limit for safe working. It is probable, however, that the duration of exposure to dust plays as important a rôle as the concentration. It is common experience amongst the workers of the mines that they develop silicosis after working in silica-laden atmosphere for a very long period. The cumulative effect of silica particles in the lung may produce silicosis even if the threshold mentioned by Cummings is not exceeded. It is also very likely that the workers, though ordinarily exposed to dust concentration below the threshold, are subjected to intensive dust-inhalation at certain periods of the working shift when the concentration of dust particles in the air exceeds the threshold. This intermittent intensive exposure may be one of the causes which lays the foundation of silicosis. The lesions develop slowly and it takes years, generally, for them to come to the stage when they produce clinical symptoms.

As regards the rate of development of the lesions, Cummings found that the rate increased slowly with the elevation of dust concentration. But from a certain level the acceleration becomes very marked. Concentration of 100,000,000 or more quartz particles per cubic foot of air was regarded as extremely hazardous and constitutes what Cummings called the "secondary threshold". In concentration above this secondary threshold silicosis might be expected to develop rapidly. In the process of sandblasting this higher threshold is probably reached or

exceeded. It is why the blasters fall a prey to silicosis very rapidly. Granite workers are attacked with the disease much sooner when they are working underground where ventilation is not good and consequently, because of less dilution, the concentration of dust is high. These workers, when they are working above-ground, do not suffer greatly; but they do so, when they use pneumatic drills (Sutherland, 1931) which cause excessive concentration of dust. Tatham pointed out that, since 1881, the fatality due to non-tuberculous diseases of the lung has increased greatly in all the coal-fields of England. Cummins (1932), quoting Tatham, asks why the fatality should increase when the general amenities of coal-mining were improving and when the mortality from pulmonary tuberculosis was falling steadily in all sections of the population? He attributes this increase to the introduction of mechanical drills in the mining industry which produce intensive dust concentration. About fifty years ago, before the advent of mechanical drills (to bore through layers of stone between the seams of coal) in coal mining industry, a miner bored a heading at the rate of a few feet a day with the hammer and chisel. But nowadays he bores at the rate of four feet in half an hour with a mechanical drill. Williams (1933) points out that in such cases 'there is an increase of rock dust produced corresponding to the increase in extent of rock drilled in the man's working shift'. The risk, therefore, is far greater when the workers use these modern devices—steam, electric, or compressed-air drills, as the case may be. These findings seem to show that the lungs can deal with the dust to a certain extent. If the output or elimination balances the intake no harm results. But when the entry is greater than elimination, accumulation begins and gradually the pathological process is established. During the writer's (1937) investigation amongst the South Wales coal-miners he detected a number of cases of silicosis in young workers. Such young workers never used to get the disease before the advent of these modern contrivances.

(iii) *Size*.—The size of the particles of the dust-cloud emitted during the working process has a very definite relationship to the production of disease. The smaller the size of the dust particles the longer will they float in the air. Thus, they afford a better opportunity to be inhaled by the workers, and, as they maintain the concentration of silica per cubic foot of air higher, it is more likely to produce silicotic reaction.

It is possible that the size of the particle has definite relation to its penetrative power in the deeper parts of the respiratory tract. The bigger the particle, the more likely is it to be caught in the external respiratory passage and thrown out without producing any harmful effect. The microscopic examination of silicotic lung tissue after acid digestion shows that about 70 per cent of the silica particles are of a diameter less than

one micron; and the remaining thirty per cent varied between one and 6.5 micra. This finding introduced the idea that particles up to 5 or 10 micra are 'respirable', and those above ten micra are not 'respirable'. Cooke believes that this division of dust into respirable and not respirable is not proper. He says that in the trypsinized deposits, which also contain those minerals that are soluble in acid, one often sees particles measuring from 20 to 100 micra in length in the lung of coal miners. Halliburton and McDowall (1933) stated that the average size of the alveoli was 300 to 500 micra. It is therefore likely that large mineral particles may be inspired into the lung where they can reach up to the alveoli. Whether such large particles can do chemical or mechanical damage is, of course, doubtful. Gardner and Cummings (1933) found in their animal experiments that the size of the particles in tissue has a definite relationship to the nature of the lesion produced. 'Particles less than one micron in diameter act quite like colloidal silica and cause acute inflammation and even death from necrosis of the liver within a few weeks. Particles of from 1 to 5 micra in size produce progressive fibrosis in the liver, with the formation of nodular lesions similar to those in the lungs caused by inhalation of silica dust. Particles of from 10 to 12 micra in diameter stimulate the formation of small foreign-body tubercles which do not change materially during a period of two years'. It may be deduced from these experimental findings that large particles, even if they enter the deeper parts of the lung, are not responsible for the production of silicosis.

This difference of reaction may be explained by the 'solution theory' of silicosis. The size becomes an important factor in the solubility of silica. The smaller particles expose a greater total area of the dust to the action of plasma. The result would be rapid solution leading to greater concentration of the mineral in the tissue in a given time. This difference of concentration produces different reactions. Mellor (1913) supplied definite data regarding their solubility *in vitro*. He made emulsion of powdered rock crystals and flint with 15 per cent solution of potassium hydroxide and worked out the following data:—

Average diameter of grain	..	165 micra	32 micra
Rock crystal dissolved, per cent		0.96	6.40 "
Flint, dissolved, per cent	..	2.52	12.10

Thus, it was evident that the solubility of the mineral increased by about 6 times as the size decreased by about 5 times. That this might occur in the tissue fluid in the lungs in a modified form was deemed possible.

From what has been said before it seems that the smaller the dust particle the greater is its capacity to produce disease. It is also likely that very large particles do not cause any harmful effect. Cummings (1934) is of the opinion

that the 'effective size range' of particles causing disease is 5 micra and under. Franks (1934) thinks that the most dangerous size is from $\frac{1}{4}$ to 6 micra in diameter.

Silicosis and tuberculosis

The presence of silica dust in certain industries is not only dangerous for the fibrosis of the lungs it induces but also it makes the tissue very susceptible to tuberculosis. Gardner (1929) was able to produce progressive disease in silicotic animals by an avirulent strain of tubercle bacillus (R_1) which in the normal animal did not produce progressive disease. That the association with silica makes the bacillus more virulent could not be proved by him. Kettle (1924) has shown that a necrotic area in a tissue produced by silica predisposes this focus to the localization of tuberculosis more than any other foci of necrosis initiated by other irritants. He (1930) also showed that, proportionately, more tubercle bacilli could be detected in the lesions produced by silica solution and tubercle bacilli than those due to tubercle bacilli alone. He thinks that this adjuvant action of silica is entirely due to the nature of the dust. Cummins and Weatherall (1933) have shown that this 'tuberculophile' action of silica is strictly local and of short duration. He also thinks that in silicosis an accumulation of tubercle bacilli around areas of lymphatic obstruction may occur. Irvine *et al.* (1930) stated that 75 per cent of silicotics of South Africa died of tuberculosis. Sweany and others (1936) in their pathological study detected tuberculosis in all but a minority of silicotics. There are many other instances in the literature where a very high death rate from tuberculosis amongst the silicotics has been recorded. Why and how this 'tuberculophile' action occurs is not yet brought to light. The probability is that silica changes the reaction of the tissues in some way which makes them more liable to infection. Cummins suggested that the nature of this change might be an inhibition of the complement by colloidal silica. The proof is still to be sought.

Whatever may be the reason, the facts prove beyond doubt, that tuberculosis is very much more frequent in silicotics than in other sections of the population. In fact, there are authorities who define silicosis as a malady characterized by fibrosis of the lung at the beginning and tuberculosis in its later stages. Such definition, of course, is open to question but shows clearly the relation of silicosis to tuberculosis.

In view of these facts various efforts have been made to minimize the risk of silicosis by introducing masks, water sprays, etc., but it has not been too successful on account of the handicaps that accompany these measures. In a very recent investigation by Denny, Robson and Irvin (1937 and 1939), it was found that animals could be protected from silicosis by adding a very small percentage of aluminium dust to the silica dust. This important finding

opens out a large field of investigation. Whether aluminium dust could be mixed with the silica dust in the working atmosphere and whether such mixture would prevent human silicosis are still the unsolved practical problems of the day.

Silicosis in India.—It has been repeatedly said that in India the problem of silicosis is not acute. Whether because of the crust over the mineral or of some other different chemical nature of the mineral, it has been said that the workers of the Kolar Gold Fields do not get silicosis. But a very thorough investigation is needed before any pronouncement on such a vitally important problem is made. There is no doubt that the workers of other silica industries in India, numbering many thousands, are exposed to the grave risk of silicosis and subsequent tuberculosis. No organized effort has yet been made to survey some of these industries to find out the amount of tuberculosis and silicosis amongst the workers, and how best these could be prevented or minimized in relation to the conditions in which these workers are employed. Civilization and industrialization have brought with them many of the amenities of life, but they have brought associated evils too, and science, supported by the state, must attempt to cure some of these evils where possible.

Besides this grave risk of tuberculosis, silicosis itself causes various symptoms the chief amongst them being dyspnoea. This is an extremely distressing symptom and disables the workers in a very short time. When well developed they can hardly walk without halting every few steps. They gasp for breath at the slightest exertion, they are unable to work and life becomes a real misery. In the writer's investigation (1937) amongst the silicotic coal-miners in South Wales, it was found that workers were disabled by this symptom within about two years from the onset of the symptom.

It was generally thought that dyspnoea was mainly due to the gradual increase of fibrosis and consequent diminution of aerating area of the lungs. It was also known that once the lung was strewn with silica dust, fibrosis progressed even when the worker left the work and the atmosphere, so that no good could be achieved by removing the worker from his work at the advent of dyspnoea because fibrosis would proceed all the same and dyspnoea increase whether he left or stayed at his work. But the writer (1937), from radiological evidence, suggested that this rapid increase of dyspnoea might be due to the rapid production of emphysema, while the worker was doing hard underground work which caused forced breathing. Cummins (1938) also called attention to emphysema as a factor in the causation of dyspnoea of pneumoconiotic coal-miners by his histological study on such lungs. If the contention of the writer is right, then much suffering of the silicotic miners could be minimized by taking them off from hard underground work and putting

them on to some kind of light work on the surface. This may keep the degree of dyspnoea at a much lower level all through his life and may enable the miner to lead a useful life for a much longer period.

That silicotic tissue is susceptible to tuberculosis has been stated. There is another side of the question, that is, whether or not an arrested or quiescent tuberculous lesion may flare up in association with silicosis? It seems to do so. The ground is prepared for re-activation through increased susceptibility. Besides, the stress and strain on the lungs that dyspnoea causes may easily be a potent factor in starting up an arrested lesion. That is why it is important that the workers for entry into any silica industry should first be thoroughly examined regarding the presence of tuberculous lesions—active or arrested. If any lesion is detected, it is better that he is not admitted into the industry.

Another problem which often arises in connection with compensation claims is whether the worker developed tuberculosis on a date prior to or after his entry into industrial life. The employers may protect themselves in some cases by an initial examination before the recruitment of the workers. A pre-employment medical examination is, therefore, helpful for both the employee and employer.

(B) *Inert dusts*

Inert dusts are those which are insoluble in body fluid. Coal-dust belongs to this group and might cause fibrosis of the lungs when inhaled in a large quantity. There are, of course, many authorities, as for example Kettle (1933-34), who believe that silicon derivatives are the only dusts to be reckoned with in the production of pneumoconiosis. Kettle writes as follows: 'So far as I know, no substance other than silicon derivatives causes more than a very moderate degree of fibrosis of the lungs, certainly not enough to interfere with its functions'. Willis (1921 and 1922) could detect some fibrosis of the lungs in his animals which were exposed to coal-dust for two years, but failed to detect any fibrosis in one year. Cummins (1935), on the other hand, believes that if the dusts accumulate in any marked extent they exert mechanical action characteristic of foreign bodies and produce a certain amount of diffuse fibrosis around the dust deposits. Gardner (1933) also thinks that coal and hematite tend to produce sub-pleural and peri-lymphatic pigmentation with the formation of considerable cellular connective tissue in these locations. The writer (1937) in his series of cases detected a large accumulation of dust and considerable fibrosis in screeners of the mining industry who work on the surface and inhale only coal-dust, in contrast to the underground workers who inhale stone-dust also.

It is, therefore, probably true that inert dusts, when inhaled in a large quantity, may accumulate and produce diffuse fibrosis by the 'foreign-body' reaction. But, so far as is known, this fibrosis does not impair the functions of the lung to any great extent and cause much disability. This is why the presence of such dusts in the industry is not so dangerous as the presence of chemically-active dusts.

Mixture of chemically active and inert dusts

Coal-mining industry does not consist in dealing with coal only. Between the seams of coal there are layers of stone, rich in silica. In order to get at the coal, these layers of stone must be 'hored' through or demolished by 'shot firing'. Those men who work on the stone are classed as 'hard-ground' workers. They are borers, shot-firemen and repairers. These men are subjected to intensive stone-dust inhalation and may suffer from silico-anthracosis. Other underground workers in a coal mine, e.g., hewers, are also exposed, though not to so intensive inhalation of stone-dust. In fact, an analysis of dust in the South Wales steam-coal-mines by the team workers of the Welsh National Memorial Association (Brownlee *et al.*, 1931) showed the following results: (a) from floors, 60 to 70 per cent stone-dust and 30 to 35 per cent coal-dust, (b) from roof and sides, 75 to 85 per cent stone-dust and 15 to 25 per cent coal-dust. Such findings show that all underground workers in a coal-mine inhale large amounts of silica-containing dust during their working hours. Some writers, as for example, Haldane [Kettle (1933-34) and Carleton (1924)], believe that the coal-dust in human tissue acts as a stimulant for the brisk action of the phagocytes. For this reason it is responsible for the rapid elimination of much of the silica-containing dust and thereby acts as an ameliorating agent in the production of silicosis. Kettle (1930) doubts this. His experiments confirmed no such 'characteristic cleansing property' of silica by coal-dust.

Coal-dust, on the other hand, mixed with silica dust, might produce 'accumulative effect' instead of 'cleansing effect' as has been suggested. Silica-dust will produce fibrosis in and around the lymphatic system, thus obstructing the portal of exit of the coal-dust. Thus a liability to retention of this dust will occur which in a normal lung would go out unhindered. Cummins and Sladden (1930) and Cooke (1932) are of opinion that the retention of coal-dust in quantities sufficient to cause anthracosis seems to occur only in the presence of silica-dust. The amount of silicotic fibrosis at which lymph stasis may occur to a sufficient extent to lead to retention of another type of dust has not yet been determined, but Cummins (1935) thinks that it probably falls far short of what might be expected to produce recognizable silicosis where silicious dust alone is in question. In cases investigated by him 'there had occurred a vast and dangerous accumulation of coal-dust in lungs

of which the total silica in ash, as determined by chemical analysis, was only about twelve to fourteen times the normal, whereas in advanced cases of silicosis the percentage may be from thirty to fifty times the normal, taking the normal as about 1 per cent'. With this background of silicosis the accumulation of coal-dust may be very great. An advanced anthracotic lung of this type is full of coal-dust and at places looks like solid coal. That much of the miner's dyspnoea is due to this seems to me to be beyond doubt. The anthracosis of a coal-miner is then a 'dual condition'. Coal-dust, though not harmful in itself, through this blocking of the lymphatic system by silicotic fibrosis, accumulates and produces harmful mechanical effects.

Silico-anthracosis and tuberculosis

The diagnosis of tuberculosis in pure silicotics is much easier than in silico-anthracosis. In silicosis, the x-ray picture shows discrete nodulation throughout both the lung fields and at a later stage these shadows conglomerate to form dense opacities in some areas. Tuberculous infiltration in such a lung shows a localized area with all its characteristics which may be differentiated from the nodular shadows of silicosis. But in anthraco-silicosis the nodular character of the shadows is lost and the mottlings tend to be hazy or fuzzy in appearance. Pancoast *et al.* (1934) in such cases suspect the presence of tuberculosis if the mottlings are peripherally situated and if the trachea is deviated to one side. In addition to these the present writer thinks that one should note the fluffy look of the shadows, lack of demarcation, signs of breaking down of tissue and apical localization, to diagnose the presence of concomitant infection. If the periphery of the shadow is much less dense than the centre and spreads irregularly, one should suspect the lesion of tuberculosis along with pneumoconiotic fibrosis. Belt (Pancoast, *et al.*, 1934a) noticed in many cases fibrosed nodules surrounded by tuberculous tissue. Such lesions produce the above picture.

Besides these radiological difficulties the clinical diagnosis of tuberculosis in silico-anthracosis presents difficulties too. In pure silicosis the toxæmic symptoms of tuberculosis reveal themselves, whereas in silico-anthracosis these symptoms are generally masked. Cummins and Weatherall (1931) showed that coal-dust is capable of adsorbing the active principle of tuberculin in very dilute solution. It is, therefore, likely that some such action of adsorption of tuberculin by coal-dust occurs in the lung tissue and amelioration of the toxic symptoms results. This makes the 'miners phthisis' benign and eludes the diagnosis of tuberculosis in most cases. These are diagnosed generally as cases of bronchitis. In an unpublished work, the writer, to find out the frequency of tuberculosis in silicotic coal-miners,

made a histological study of such lungs and detected the presence of tubercle bacilli in 42.08 per cent of lung specimens. He (1937) made clinical and laboratory studies of the silicotic coal-miners and found 35 per cent (12 definite and 23 probables) had tuberculosis, many of whom had no symptom of the disease. In view of these findings the writer came to the conclusion that there was a high incidence of tuberculosis amongst the silicotic coal-miners and that coal-dust modified the toxicity of tuberculosis, leading to failure to recognize the disease, and to the mistaken diagnosis of bronchitis. These undiagnosed men spit out tubercle bacilli and infect their families and fellow workers. Thus, bronchitis amongst these men should be viewed with suspicion and thoroughly investigated before such a diagnosis should be accepted.

Predisposition

Though the nature of the dust is responsible for the production of pneumoconiosis and tuberculosis, it will be giving a wrong idea if we accept this as the only cause. Hundreds of workers work under the same conditions and are exposed to the same kind of dusts. Not all of them suffer from the disease. This raises the question of soil or the condition of the body. This predisposition to pneumoconiosis lies, very likely, in the deficiency of the eliminative function of the lungs. In this case, a congenital origin or familial predisposition seems likely; but an enquiry in this direction by the writer did not justify the conclusion that such family predisposition existed.

In this connection the dust-filtering efficiency of the human nose has also been blamed by Lehman (1935). He claimed that this efficiency varied a great deal between healthy persons and the silicotic miners. In healthy persons of various ages, 65 per cent had retention efficiency over 40 and only 10 per cent below 30, whereas in the silicotics only 20 per cent were over 40 and 62 per cent below 30. Thus, he suggested that people with bad filtering efficiency were liable to pneumoconiosis. Mouth breathers evidently do not get the advantage of this filtering action of the nose and may be more prone to pneumoconiosis.

The main considerations should certainly be directed to the eliminative system of the lungs. Any damage to this system is likely to cause retention of dust. The relationship of the damage of the respiratory mucous membrane to the production of silicosis has been shown in experimental animals by Robson, Irwin and King (1934). They could produce earlier and more acute lesions of silicosis in those animals whose respiratory mucous membrane had previously been damaged by the inhalation of dilute irritating gases (NO_2 and SO_2). Their above experiments tend to show that the noxious gases produced after shot-firing in coal-mining industry may be a very important

factor in the production of early silicosis. In fact, these miners have been found to suffer from silicosis in a very large percentage.

There are differences of opinion regarding ordinary bronchitis as a predisposing cause. Haldane (discussion of Fisher's paper) was of opinion that this was one of the major factors in the production of pneumoconiosis in South Wales coal-miners, but Kettle does not believe that bronchitis causes deficient elimination. If it does anything, it enhances the expulsion of dust with the coughing out of the mucus from the respiratory passages.

The lymphatic drainage system, if blocked by any disease, will cause an accumulation of dust. Tuberculosis of this system may be one of the contributory factors. The part it plays in the production of pneumoconiosis has been described by Gardner (1925) in the following words: 'In case the nodes are normal, many years will be needed to obstruct them; while nodes already heavily involved with healed or healing tuberculosis would more readily react to smaller amounts of dust, and an obstructive fibrosis would occur after a much shorter time. Such an explanation could account for the great irregularity in the time required for the development of demonstrable silicosis in industry'. Any other parenchymal disease of the lung which causes localized damage to the lymphatic system should also be counted as a predisposing factor. Besides tuberculosis, atelectasis, chronic unresolved pneumonia, localized fibrosis due to any disease, and localized pressure due to any growth, all fall into this group.

From the above considerations it will be evident that pre-existing diseases of the lung may play a very important part in paving the way for the production of pneumoconiosis. In view of this a thorough medical examination of the worker before he is employed in a 'dusty industry' is of the very great importance for the prevention of pneumoconiosis, specially in cases of industries producing dangerous dusts in their processes.

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TUBERCULOSIS OF LYMPHATIC GLANDS IN THE NECK

By M. M. CRUICKSHANK,

LIEUTENANT-COLONEL, I.M.S.

Professor of Surgery, Medical College, Madras

TUBERCULOSIS of lymphatic glands is characteristically a disease of childhood, occurring usually in the first year of life, running an acute course in the beginning, but, with every succeeding year of life, tending to chronicity, because of the increasing resistance established in the child's body. Cervical tuberculosis is more prevalent than the glandular disease elsewhere and

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is frequently the first manifestation of the disease.

The infection is carried by two paths, by the lymph and by the blood stream. The lymph spread is by far the more common and occurs in a large majority of cases, the primary focus being in the tonsil, in nasopharyngeal adenoids, or in carious teeth.

A clinical distinction of the two groups is usually possible, because with a blood infection multiple scattered glands are more likely to be attacked, whereas with a lymph infection the disease remains for a long time confined to one or two adjacent glands. Therefore, operation is contra-indicated in cases due to blood spread.

The anatomy of a lymph gland presents some very interesting features. Between the lymphoid tissue of the interior of the gland and the fibrous capsule surrounding it, lies a narrow channel, bridged across by strands of connective tissue. This channel is called the 'gland corridor' and the interlacing septa of connective tissue are of the nature of filters which arrest the organisms in their course through the gland.

At the hilum, blood vessels enter and leave the gland, and efferent lymphatics emerge, while the afferent lymphatics pierce the capsule to enter the gland at various sites around its periphery. The lymph stream enters the surface of the gland by afferent vessels, circulates through the corridor, permeates the lymphoid tissue, and emerges at the hilum through efferent vessels. Therefore, in a lymph-borne infection, caseation commences at the periphery of the gland since the lymph stream reaches the gland at that point: whereas in a blood-borne infection it begins at the centre, because the main blood vessel passes to the centre of the gland before it breaks up.

If the infection is a lymphatic one then the chief portals of entry are, as I have already said, the tonsils, the lymphoid tissue of the nasopharynx (adenoids), and the teeth. The bacilli are carried into the lymphatics by phagocytic cells and are deposited in the lymphoid tissue of the first lymph gland arrived at. The toxin produced by the bacilli precedes the bacilli and sets up an intense lymphocytosis in other glands through which the lymph passes, narrowing lymph sinuses, filling them with lymphocytes, and thus rendering the glands less pervious to the passage of tubercle bacilli.

Secondary tuberculous adenitis of the cervical glands may be associated with tuberculous ulceration of the tongue, lips, pharynx, larynx, nose, etc., or with tuberculous middle-ear disease, rarely secondary to lupus of the face. In these cases the glandular disease is not usually extensive and is of less importance than the primary affection.

Of the various groups of glands affected by the disease, those draining the tonsils, the adenoid tissue of the pharynx, and the teeth, naturally show special liability to infection, the

highest individual incidence. The disease has a high incidence in the jugulo-digastric

The lower deep cervical glands are often enlarged during the course of tuberculosis of the lung, or as a result of infection of the tracheo-bronchial glands. This is often affected as a sequel to abdominal tuberculosis, the infection being conveyed by the lymph duct. Infection of the lower cervical glands is frequently followed by the appearance of enlarged glands in the axilla, a retrograde infection along lymph vessels.

If, however, the infection is blood borne, the original site of the disease may be difficult to find.

Pathological changes

Infection having occurred, pathological changes are set up in the gland, and these changes are of two types:—

1. In the *caseating form* the changes are typical of tuberculosis in other parts. Tuberculous follicles are seen with a central area of endothelioid cells containing giant cells surrounded by a zone of lymphocytes. Caseation occurs in the central area and enlargement of the caseous area and confluence of adjacent tubercles may proceed until the whole gland is replaced by white cheesy material.

At any stage, the disease may be overcome and follicles replaced by fibrous tissue and ultimately calcification may occur. Such calcified tuberculous glands are very common, especially in the mediastinum or in the mesentery of the small gut, though they are less often found in the neck. If the disease progresses, peri-glandular connective tissues are involved and adjacent glands become adherent to one another. Cold abscesses may develop and may infiltrate fascial planes and muscles. Eventually abscesses point at the skin surface and burst, leaving tortuous sinuses which remain as long as the glandular infection persists.

2. In the *proliferative form* the pathological process is of a different type. Giant cell systems are scanty or absent and there is little or no caseation. The glands are swollen and elastic, on section fleshy and greyish pink. Microscopically, the characteristic feature is a diffuse proliferation of endothelial cells with a variable degree of fibrosis. Obviously here the differential diagnosis is from lymphadenoma and the distinction is often difficult.

Just as there are two methods of dissemination, two types of pathological change, so, two distinct clinical types may be recognized.

In the first, the adenitis is a manifestation of a widespread tuberculosis. The patient is pale, thin and anæmic with active disease in the mediastinal lymph glands and in the lungs. The affected cervical glands are multiple and situated in both anterior and posterior triangles of the neck on both sides. The glands, not greatly enlarged, are of soft consistency and rarely caseous.

factor in the fact, the second type, and this is the type more from in surgical practice, the child is often poorly looking and shows no other evidence of tuberculous disease. The condition is purely a local infection. Generally one gland is grossly diseased, whilst a few adjacent glands are involved to a lesser degree. The principal gland affected is usually the jugulo-digastric, or tonsillar, gland, in the angle between the common facial and internal jugular veins. Less often a submaxillary gland or one in the posterior triangle or lower part of the neck is the main site of the disease.

In this type the gland principally involved may progress to caseation and to the formation of a cold abscess and the skin over the abscess may break down and a tuberculous sinus result.

Clinical features of tuberculous glands

The features of tuberculous glands are their chronicity, the peri-adenitis fixing the glands more or less to surrounding tissues, the infection of many glands and their tendency to soften. But variations are met with, as we can surmise from the pathology; the disease may be almost acute, there may be no obvious periadenitis, the disease may be limited to one gland, softening may not occur, and the glands may calcify.

If the disease progresses, further peri-adenitis leads to matting of the glands into one nodular mass, caseation may occur, cold abscesses may form, and a mixed infection may be added, with true suppuration. Sinuses lined by granulation tissue form, leading from gland to gland, and these refuse to heal until all granulation tissue has been destroyed. A cut section of such a gland shows translucent grey patches in the earlier stages; later, these become opaque, yellowish and granular owing to the occurrence of necrosis and caseation. With the occurrence of suppuration a creamy homogeneous yellow fluid exudes from the cut surface.

Symptoms and course

An indolent, painless, slow enlargement of glands with no deterioration in health is a characteristic feature. Later on, when the glands caseate, there is some degree of malaise with some little diminution in energy and strength, and the evening temperature tends to rise.

With the onset of softening and abscess formation there is pain, and tenderness, stiffness of the neck, the skin becomes red and discoloured and constitutional disturbances become still more marked. Progress in some cases may be rapid, group after group of glands being involved, until finally the patient dies of generalized tuberculosis or of tuberculous meningitis.

The differential diagnosis

It is well to remember that the superficial cervical glands are not liable to tuberculous infection and therefore when they become enlarged, there is very little tendency to a peri-

adenitis, so that they are readily felt slipping about under the platysma.

A *simple acute or subacute adenitis* may present difficulties because acute cases of tuberculous infection do occur. The problem of diagnosis is a difficult one in early cases but in time the simple cases subside while the tuberculous ones persist, and if abscess formation should occur, then aspiration and bacteriological examination of the pus will decide the diagnosis.

Similarly, the *simple chronic adenitis* which accompanies enlarged tonsils, carious teeth, and skin conditions, clears up when the source of the infection has been dealt with.

Lymphadenoma is said to resemble tuberculous disease of glands but the indirect distribution, the smaller, firmer discrete glands, which never soften and break down, serve to distinguish Hodgkin's disease. Add to this a blood picture of eosinophilia, an enlarged spleen and a Pel-Ebstein type of temperature chart and the diagnosis does not long remain in doubt*.

The glandular enlargements of *lymphatic leukaemia* are excluded by an examination of the blood, while the lymphosarcomas are recognized by their painful and more rapid growth.

In *secondary syphilis* the glands are symmetrically disposed in many regions, are multiple, firm, and freely movable, and not tender. It is well to remember, however, that in chancre of the lip or mouth the glands may be matted together in painless masses.

Secondary malignant glands are recognized by their progressive increase in size, by their fixity on account of infiltration of surrounding tissues, by their hardness and the pain elicited on palpation.

When suppuration occurs, then one has to think of a *simple acute abscess*, or of a *suppurating branchial cyst*.

An acute abscess is under a certain amount of tension, the reddened skin over the abscess is œdematous, and extends beyond the limits of the fluctuating area. In a *cold abscess* on the other hand the tension is low, there is no œdema, and the area of fluctuation extends to the limits of the red area of the skin.

A suppurating branchial cyst, like a tuberculous abscess, lies under the deep fascia but a branchial cyst is single and unilateral while it would be rare indeed to find a single unilateral tuberculous abscess.

The prognosis

This is affected by the answer to the question 'Was the infection lymph borne or was it blood borne?'

* We do not agree that the differential diagnosis on clinical grounds is as easy as this. Neither eosinophilia nor the Pel-Ebstein temperature chart are constant, and splenic enlargement is too common a finding to be of much diagnostic value in this country. The Gordon test in the early stages and the histological examination of the glands, later, are the only certain diagnostic tests for Hodgkin's disease.—EDITOR, I. M. G.

In the former case one is dealing with a local manifestation of a local disease which for some time at least remains local. In the latter, a tuberculous septicaemia is pre-supposed, and the future outlook is correspondingly imperilled.

Therefore, the association of cervical disease with a tuberculous lesion in another part of the body, the irregular distribution of the tuberculous disease in the neck, the central manifestation of the disease in the gland, all evidence suggestive of a blood infection in contrast to a lymphatic one, tend to increase the gravity of the prognosis.

The prognosis deteriorates still further when the posterior chain of glands becomes infected, because of the danger of the formation of a retro-pharyngeal abscess and again when the supra-clavicular glands are involved when the spread of infection to the lungs or mediastinum is to be feared. In very young children the prognosis is bad, because of the absence of any acquired immunity.

Treatment

This is a most controversial subject. Opinions are diverse and must remain so until a specific remedy for tuberculosis is discovered. One might classify treatment as, (a) prophylactic, (b) general, and (c) local.

(a) Prophylactic treatment naturally comes first and is all important. Prophylaxis means protecting our children and in safeguarding their food supply. This means dealing in the first instance with milk supplies and a campaign for a pure-milk supply and for a sufficient diet would be of more value by far than any plans, however elaborate, for devising bigger and better operations for the removal of tuberculous glands or for the provision of larger sanatoria for the treatment of tuberculous patients. That is, a campaign for compulsory and controlled pasteurization of milk in quantities sufficient to meet the minimal requirements of our growing infants*.

To safeguard the child means that we must find, isolate, educate and treat all adult cases.

Some years ago when I visited the large leper settlement then on Robin Island in Table Bay, the doctor in charge said to me 'here you see us in South Africa dealing in this stringent manner with a disease, leprosy, the lethal effects of which pale into insignificance compared with the killing effects of tuberculosis, a disease about which we do next to nothing'. That, fortunately, cannot be said to-day of us in India, but the statement holds more than a grain of truth.

General treatment plays an important rôle before the disease attacks the exposed child, but

is of maximum importance when the disease has claimed its victim.

The child must be put under the best possible conditions with regard to hygienic surroundings, be given a liberal diet, a moderate amount of healthy exercise, and by medical attention the natural resistance of its body must be increased to secure if possible a natural arrest of the disease.

We hear much about the beneficial effects of sunlight, little about the evil effects of bad housing and poor general economic conditions. Listen, however, to what Sauerbruch says:—

'The remarkable fact is that swollen tuberculous glands in children who live in high mountains will not heal up in spite of the sun and direct radiation, but rapidly improve at sea level or when treated by brine baths in the plains. How can we explain such a paradox?

The intensity and character of the solar radiation varies with the angle of incidence of the sun's rays, the density of the atmosphere through which they penetrate, the purity of the atmosphere, the presence in the air of moisture, dust or smoke, the amount of sky-shine and of reflected light, the intervention of passing clouds. Moreover, latitude, locality, altitude, climate, temperature, direction and force of the wind, proximity of sea, mountains, rivers or lakes, forests, fields, and even the nature of the soil, all are factors not to be neglected.

Thus, we see that sun treatment, wherever undertaken, must be administered under continually changing conditions, even when applied in one particular district. The one unchanging factor is that, of constantly changing conditions, light is a tonic to both mind and body'.

One remarkable piece of evidence of the beneficial effect of light is seen in its influence on the healing of sinuses and this when light is applied to the body as a whole and not to the sinus itself. The effects of sunlight can be obtained by a carbon arc lamp of 25 amperes. The result is a definite improvement in the hæmoglobin content of the blood, in weight, in calcification of bones, and in well-being and energy.

Great stress is laid on measuring the doses of sunlight in treatment, beginning with half minute exposures to each side of the body at a sitting and in increasing the exposures to a maximum of 15 minutes to each side of the body.

Rollier of Leysin, to whose genius we owe the inception of heliotherapy, began by exposing the feet for 5 minutes twice daily and continued exposing more and more of the body till the whole was exposed, till finally the children lived in such sunlight as was obtainable in northern latitudes.

Exposures, however, may be overdone with resulting malaise, a feeling of lack of well-being, loss of appetite, some pyrexia, and perhaps an increase in local symptoms.

Tuberculin and pure protein derivatives have their advocates, abscesses being merely aspirated. Large masses of tuberculous glands will

* Whilst any measures that would ensure a purer milk supply *without adding to the cost of the milk* would be welcome on general sanitary grounds, we must remember that bovine tuberculosis is extremely rare amongst cattle in India. Pasteurization of milk cannot in these circumstances be considered as an important method of reducing tuberculosis in India.—
Editor, I. M. G.

disappear after milk treatment and Halliday Sutherland reports a case of a child who had suffered from discharging tuberculous sinuses for 2 years, whose condition cleared up in 6 weeks with tuberculin treatment.

Tuberculin is of value after operation because, though tuberculous glands have been removed, others are likely to have been left behind, and, though tuberculosis of lymphatic vessels has not been demonstrated, yet their fluid contents might well contain living tubercle bacilli.

Again, on the other hand, to the prolonged use of tuberculin is attributed peri-glandular adhesions, which will, if operation is decided upon, increase the difficulties of excision.

Local treatment.—The many and diverse views with regard to local treatment might be summed up under four headings:—

1. Where it is considered that all cases should be treated by medical and by conservative means, the only surgical and local treatment being aspiration of breaking down glands.

2. Where it is considered that all diseased glands should be excised.

3. Where it is considered that surgical treatment is called for only under certain well-defined indications.

4. Where it is considered that diseased glands should be treated by deep x-ray therapy or the application of radium.

1. *Requires no further comment.*

2. *That all diseased glands should be excised.*

All is a big word and when we remember that to remove all the glands may be quite impossible, and also that, if their removal were possible, yet the term 'All glands' cannot include lymphatic vessels which may contain the tubercle bacilli, then this view is simply mentioned to be passed over. But again some may ask, do we want to remove these glands, which battle with those organisms that have passed the first line of defence—the tonsils and sub-mucous lymph tissue of the upper respiratory tract?

If the cervical glands do not become enlarged these organisms may proceed further and gain entry into the blood stream and produce widespread damage.

3. *Surgical treatment under certain well-defined indications.*—Contra-indications which might be mentioned are:—

(1) If the disease is blood borne.

(2) If distribution of glandular disease is haphazard and irregular which suggests a blood-borne infection.

(3) If the case has previously been submitted to incision and curetting.

(4) If the patient is in the first year of life.

(5) If axillary glands are affected; this points to infection of mediastinal glands.

Indication for surgical treatment

Points worth remembering are:—

(a) In children, ninety per cent of cases are the result of a lymphatic spread from a local

area of absorption, and for a considerable time the disease remains local and gross infection by the blood stream is a late complication.

(b) As we have no specific anti-bacterial agent to overcome the tubercle bacillus, the wisest course then is to remove the affected gland or glands before blood invasion occurs.

(c) It is of significance to note that the bovine type of tubercle bacilli is found in a proportion of cervical gland tuberculosis varying from 25 per cent in Germany to 90 per cent in Scotland and that the bovine type occurs uncommonly (1 to 2 per cent) in pulmonary tuberculosis*.

The proportion in Madras, so far as I know, has not been worked out.

(d) The cosmetic result. The scars following a well-planned operation, if carried out before caseation and suppuration have occurred, may be less disfiguring than those following natural cure, but statistics go to show that the results of natural cure are not so calamitous as some make out, and are by others considered superior to those of surgical excision.

The indications for surgery then may be considered to be—

(1) persistence of the disease in spite of conservative treatment;

(2) the slightest evidence of caseation.

Excision completed, then a course of ultra-violet therapy could do nothing but good.

If surgical treatment be deferred until caseation occurs, then excision of the glands will probably be impossible and curetting will have to be resorted to. The cosmetic result can then only be bad and recurrences may call for a repetition of the treatment.

Extensive involvement of the glandular area of a gross type demands not operation but intensive sanatorium treatment. Relatively rarely should it be necessary to have recourse to the mutilating operations described in textbooks, where an endeavour is made to remove all enlarged glands.

In America, surgical excision is described as a barbarous survival, and has been largely abandoned during the last 10 years.

4. *The treatment of tuberculous glands with deep x-ray therapy and with radium* has been carried out in the General Hospital here. Soft glands yield better and quicker results than do hard ones which require prolonged treatment, and respond better to radium than to deep x-rays. The dosage aimed at is 400r per course and from three to six courses are required. Naturally, if the glands have broken down, aspiration is carried out first. Radium in doses of 2 to 2½ mgms. per cubic centimetre of tissue has been used, applied in the form of a pad.

(Continued at foot of opposite page)

* Work in India has, however, shown that the bovine infection is extremely rare in gland tuberculosis in this country (*vide*, Liston and Soparkar, 1917, *I. J. M. R.*, 5, 19, and Ukil, *I. J. M. R.*, 20, 1209).—
Editor, *I. M. G.*

THE PLANNING OF TUBERCULOSIS INSTITUTIONS IN INDIA

By C. FRIMODT-MÖLLER, C.B.M., M.B.,
Ch.B. (Copenhagen)

Medical Commissioner, The Tuberculosis Association of India

Now that a new impetus has been given to the campaign against tuberculosis in India, and new schemes are being developed involving the building of clinics, hospital wards, sanatoria and ex-patients' colonies, for the prevention of tuberculosis and treatment of tuberculous patients, it will probably be of help to many if some general considerations are given for the planning of such institutions. This is specially necessary in order that the limited money available for such institutions may be used to the best advantage, taking into account the modern outlook on the disease and the particular conditions found in India.

Modern outlook

The whole conception of tuberculosis has altered in the last thirty years and this has had a marked effect on the planning of various institutions for combating the disease.

(a) *Emphasis on prevention.*—In earlier years the chief activity was the isolation and treatment of those obviously sick and in need of treatment, but now without minimizing the great importance of this side of the campaign, emphasis has been rightly laid much more on prevention. This involves the detection of very early cases, and even of those not yet showing clinical symptoms, and the tracing out and dealing with sources of infection, so that in western countries special buildings have been constructed for carrying out this side of the campaign.

(Continued from previous page)

The treatment is given in small weekly doses over a period of two to three months.

It should be stressed that excessive dosage may lead to rapid breaking down and thus the most propitious moment for surgery may be missed.

Glands which have broken down may respond to deep x-ray therapy, but naturally this depends on the extent of the suppurative process. The presence of a small sinus in the neck is no contra-indication to the use of x-rays but where caseation or secondary infection is present the treatment is not likely to be of value.

It is not possible to lay down definite rules to cover the treatment of all patients suffering from tuberculosis of cervical glands.

As one reads through the literature on this controversial subject, one wonders, with a writer on the subject, where common sense comes in, when the discussion reaches the stage of a Socratic dialogue.

(b) *Development of treatment.*—In earlier years advanced cases were either left in their homes to die or removed to isolation hospitals for the same end, and only very early cases were sent to sanatoria to live in the fresh air. While early cases still recover with as little special treatment as in former days, the majority of advanced cases are no longer left to die, because the development of treatment has made it possible to send many of them back to live a normal life. This modern treatment to be successful requires in the institutions facilities for extensive laboratory work, x-ray examinations, operative work, light treatment, and, much more, nursing. This has meant a complete change in the planning of a tuberculosis institution, whether it be clinic, hospital or sanatorium.

(c) *Infectivity and location.*—The emphasis on the infectious nature of the disease, which followed the discovery of the tubercle bacillus, led to a public scare and misunderstanding of the nature of the infectivity. This fear has not disappeared yet and frequently hinders and works against the stamping out of the disease in a certain locality, by forcing the tuberculosis institution away from the very place where it is really needed. A properly run tuberculosis institution is certainly not a danger to its neighbourhood provided that regulations are made preventing tuberculous patients coming from outside areas and living in the houses in the neighbourhood of the institution without proper control or treatment. Tuberculosis does not spread from an institution even in a crowded area, because the infectious nature of the disease is far different from a disease like smallpox or measles; it is not dangerous to be in the vicinity of a tuberculous patient. It has been proved that tubercle bacilli have a very short life outside the body in the open air, and are not carried by air or dust from one building to another in a living condition. This new knowledge of the infectivity of the tubercle bacilli has had its effect on the location of tuberculosis institutions, which can now be placed wherever they are most needed.

Influence of particular conditions found in India

In buildings concerned with the prevention and treatment of tuberculosis and the after-care of the tuberculous, there are certain common essentials all over the world wherever modern methods are being carried out, but these may have to be modified in form according to the particular conditions and customs of each country.

Two factors are of special importance in India, climate and the social customs, both showing wide differences in the different parts of India, so that what may be suitable for the north may be unsuitable for the south. Full details of the modifications cannot be given, but it may be said about the social customs that more provision has to be made in India for the separation

of the men's and women's sections in an institution than in Europe, and more provision for special wards with quite separate kitchens has to be made in India where there are such wide variations with regard to community, caste and particular customs and diets. Attention to these details is specially necessary in treating tuberculosis, as the treatment usually requires a long stay in the institution.

Types of Institutions in the tuberculosis campaign

Until recently there were three distinct types of institution in a tuberculosis campaign each with its own particular functions, namely, the clinic or dispensary, the tuberculosis hospital for advanced cases, and the sanatorium, to which was added in later years as a fourth type, workshops or else settlements of some kind for ex-patients. The outlook on the disease and the development of the treatment have caused a disappearance of the sharp distinctions in function and there is now a considerable overlapping, which is however not a wasteful overlapping, but a desirable one arising through co-ordination of work in the common effort against the disease.

In India, where tuberculosis institutions are as yet few in number and will be comparatively few for many years to come, this mingling of what were previously regarded as functions of separate institutions, must be emphasized and provided for in the planning of the institutions and the construction of their buildings, although the main purpose for which the particular institution exists must not be lost sight of.

Tuberculosis clinics

(a) *Purpose and general planning.*—The main purpose for which a tuberculosis clinic or dispensary should be planned and built is the detection of the disease and the prevention of its spread from the sources of infection detected. Such detection, specially in the very early cases, requires full laboratory and x-ray equipment.

In a large town, especially, it is necessary to have good facilities for registration, history taking and examination of many persons, by different methods, in a limited time. Proper arrangements should be made for filing and keeping the records, as a modern index system concerning the patients should be, in years to come, of the utmost importance in following up the patients when they move about in the city spreading the disease to new surroundings, and would enable the institution of efficient preventive measures.

The consulting room should have an examination cubicle connected with a dressing room. This last room should also be connected with the x-ray room to serve as an ante-room to this. Further, there should be one or two rooms for giving artificial pneumothorax treatment and various injections for thoracoscopic examinations

and cauterization of pleural adhesions, and for minor operations. It is essential to have close to the pneumothorax room a resting room in which the patients can rest after refills, in the same position in which they receive the refill, for about an hour before they return to their homes.

In India it will frequently be necessary to have two small wards for men and women, where a patient can be kept for just a few days if need arises, such as at the induction of an artificial pneumothorax, or if a special complication occurs during home treatment demanding close supervision, such as aspiration of air or fluid or controlling hæmoptysis.

There should be a dispensary room and also staff rooms and sanitary rooms for patients and staff. If possible a room for light treatment should be added.

Further there should be rooms for health visitors and a conference and committee room, because no clinic can do its full work unless there is a proper staff of health visitors and frequent conferences of these with the clinic medical staff and also with a care- and after-care committee to meet at the clinic.

(b) *Location.*—From what has been said of the purpose of a clinic it will be understood that its place is not on the outskirts of a town or city, but in the very centre of the population among which it is working. Ideally a clinic ought to be self-contained with its own x-ray, laboratory, etc., but if it is found necessary for financial or other reasons to locate a clinic close to an already existing hospital, it may be possible in the first years to use the hospital x-ray and laboratory and a few beds in one of the hospital wards. But, as the work succeeds and the clinic begins to occupy the place it should in the campaign against tuberculosis, it will be found necessary to have its own x-ray and laboratory and all other facilities required, and therefore the original plan must be made with the possibility for extension, and the location must be chosen with this in view.

(c) *Type plans.*—Below are given suggestions for type plans for a tuberculosis clinic for a city or large town and for a tuberculosis clinic in the compound of a *mofussil* headquarters hospital, where x-ray facilities are available.

It will be noted that passages are so arranged as to allow of plenty of air and ventilation, and that each room is accessible from passage or verandah.

Attention is drawn to the fact that this plan has completely separate sections for men and women which is an advantage in a large town. Therefore there are two examination rooms but only one x-ray room which must be used for both.

The examination cubicle is separated off by a screen or thin wall which need only be about 6 feet high. The reason for this cubicle is that the nurse can have the patient prepared while the doctor is talking to his relatives. Moreover, during the actual examination only the nurse

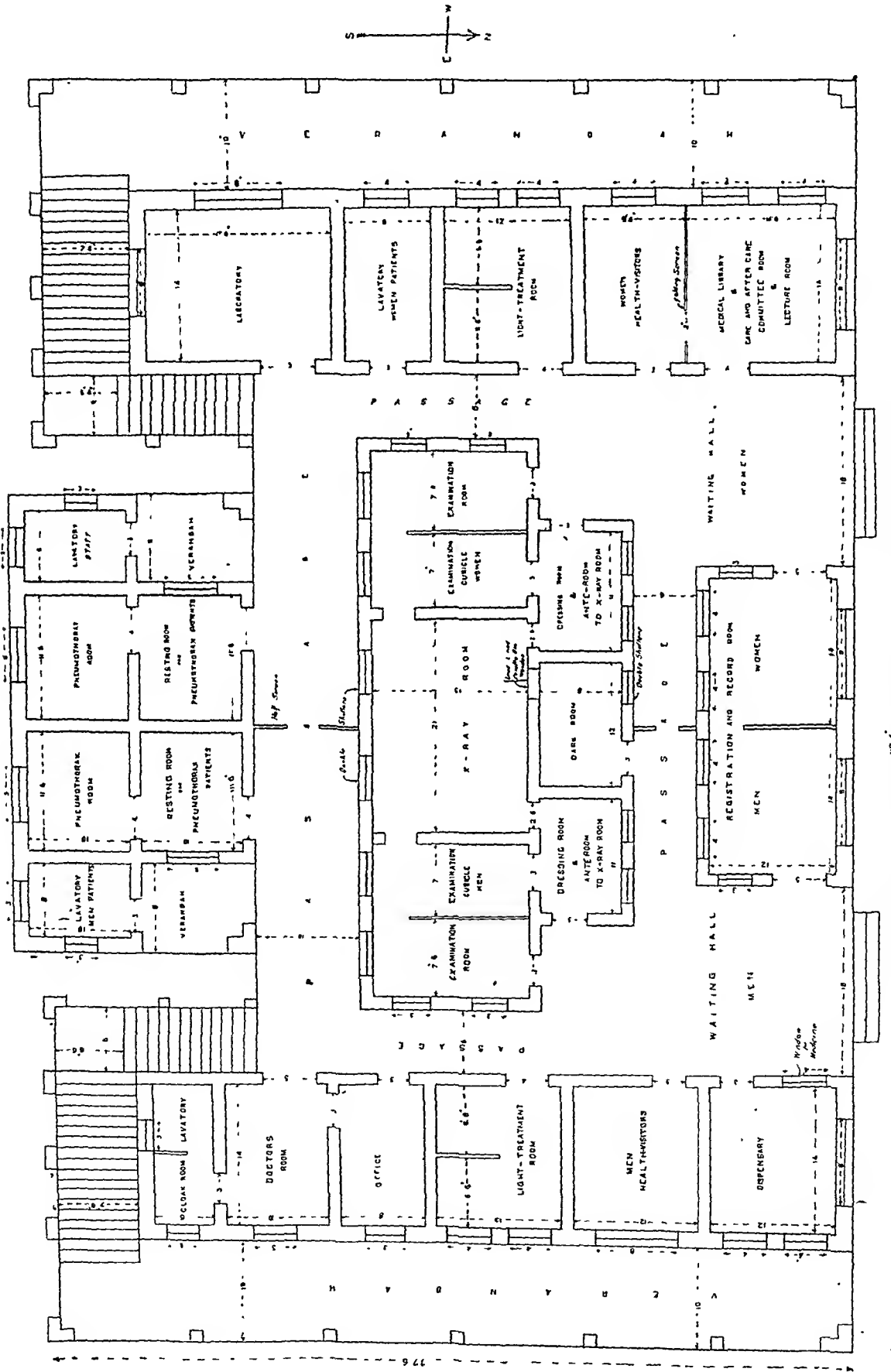


Fig. 1. Suggestion for a Tuberculosis Clinic in a large city. Ground floor. Scale, 1" = 5'.

x-ray room and another to it from the dressing room for women would be necessary. Another store room would have to be built, which will be best placed in connection with the nurses room. These various alterations and additions which would probably cost about Rs. 2,500 would complete the arrangements for installation of x-ray apparatus in the clinic.

Hospitals and sanatoria for tuberculous patients

In recent years the differences between a hospital for tuberculous patients and a sanatorium has largely disappeared, except as to location. A modern sanatorium admits advanced as well as early cases, because it has been found that many of the most advanced cases benefit strikingly when the modern treatment is carried out under sanatorium regime, in most cases even better than when such treatment is carried out in hospitals or private houses. Therefore, a sanatorium in these days should be as completely equipped as a good hospital for various kinds of surgical as well as medical treatment of tuberculosis in addition to having full facilities for x-ray and laboratory examination and light treatment.

The main difference now between a tuberculosis hospital and a sanatorium is that the hospital is situated either in or very close to a large centre of population irrespective of the climate and to a large extent of the general surroundings. A sanatorium in India should, however, be placed, wherever possible, in a place removed from the worst heat of the plains, as extreme heat is known to be detrimental to tuberculous patients. It should also be placed some considerable distance from a town in the open country with sufficient ground for graded exercises for the patients, and far enough away for the patients to be free from continual disturbing interruptions of relatives and friends and the enticements often adverse to a disciplined life so essential for a good recovery.

A tuberculosis hospital or sanatorium for about 50 beds should include the following buildings :—

General wards.

Special or private wards for paying patients.

Administration building containing examination room, x-ray, laboratory, light-treatment room, waiting room, office facilities, record room, dispensary.

Operating theatre with sterilizing and two post-operation rooms.

Quarters for two doctors.

Quarters for nursing superintendent.

Quarters for other staff.

Electric power plant, if current is not available from public supply.

Water supply.

Kitchen, store rooms (general, linen and medical).

Sewage system with septic tanks, if sufficient water is available.

Some details and suggestions for plans of some of the above buildings may be of interest :—

(i) *General wards*.—Below is a plan of a general ward of 18 beds which has been found to be very practical and suitable in South India.

The three main features of this ward are :—

(a) *Free circulation of air*.—The building has completely open sides, but the ends are protected by rooms at the corners and the ward should be placed in the direction of the prevailing winds, specially the monsoons, and not across. This arrangement prevents the rain beating in during the wet season. If excessive wind or rain does come from the sides protection can be obtained by letting down *chicks* between the outside verandah columns carrying the roof extension. These *chicks* should not reach to the ground but should stop about one foot from it, so that even if all the *chicks* are let down including those at the end passages, there will still be a free circulation of air. Any dust which may be thrown in is stopped by the raised basement and parapet wall.

(b) *Semi-privacy*.—The beds which are placed lengthways are separated by pillars about 1½ foot square. This breadth of pillar is not really necessary for carrying the roof of corrugated iron with country tiles, but it has an important additional function of providing semi-privacy for each patient, although he is in a general ward. A patient in the bed marked 'X' in the plan, can, when lying down, see only the two patients in beds 'Y' and 'Z'. This is of special importance when patients are together for a long period, often a year or more, as it minimizes causes for friction, which may more easily arise if the beds are placed side by side in one large hall. The arrangement of beds lengthways between broad pillars is also of very great importance when a patient is very sick or has hæmoptysis, both for his own sake and for the psychological effect on the others. A small screen placed on the inside only of the bed can then produce complete privacy without hindering the nursing or blocking the air.

(c) *Hygienic features*.—Between each bed across the centre of the ward is a distance of 9 feet, and there is the same distance from one bed head to the next. This is a safe distance from the point of view of infection from one patient to another; droplets of moisture containing bacilli produced in coughing fall to the ground in considerably less than 9 feet.

The water used in washing the ward is prevented by the parapet wall from flowing out under the roof extension where the sun could not beat on it and destroy the tubercle bacilli in these washings. Drains, not shown in the plan, carry the water to a septic tank and thus eliminate the possibility of dust-borne infection.

In order to have the wards as free as possible from anything that would prevent the keeping of them washed, clean and tidy, and free of things which would collect infected dust, corner

rooms are provided for the boxes and other possessions of patients. One corner room is reserved for a duty and medicine room for the nurse in charge of the ward.

Suggested modification for North India

The ward is too open for many places in North India both because of the prevalence of hot scorching winds in the summer, and the piercing cold in the winter. Instead of the *chicks* some more permanent form of protection should be provided, such as folding doors or large windows. In this case it would probably be preferable to have a flat roof over the verandah sections.

If for one reason or another closed wards of the ordinary hospital type are used, there must be provided either broad open verandahs in connection with the building or close to it where patients can lie on beds or easy chairs during the resting hours in the daytime.

(ii) *Special or private wards.*—In a sanatorium of 50 beds it is suggested that at least 10 of the beds should be in small separate wards or cottages with separate kitchens for each ward. This is partly to provide accommodation for a class of patients who would not care to be treated in the general wards and partly as a means of providing an income towards the maintenance of the general ward patients. The following is a plan for a very inexpensive special ward which in South India costs about Rs. 500 complete including equipment and kitchen. The ward is equipped with *chicks* or *tatties* on the three open sides and bamboo mats for shade extension, electric light and the following furniture:—taped cot with mosquito poles, table with drawers, ordinary chair and easy chair, food locker, sputum cup and sputum cup stand, shelves in the box room and commode. The separate kitchen has an outside measurement of 10 feet by 10 feet.

In addition to this cheap ward of light construction, two wards of better type more spacious and with more convenience are given below.

The building is a double ward but with complete separation for the patients and with separate kitchens. These are not shown in the plan; they are built separately at a distance of fifteen feet from the ward. The cost of this

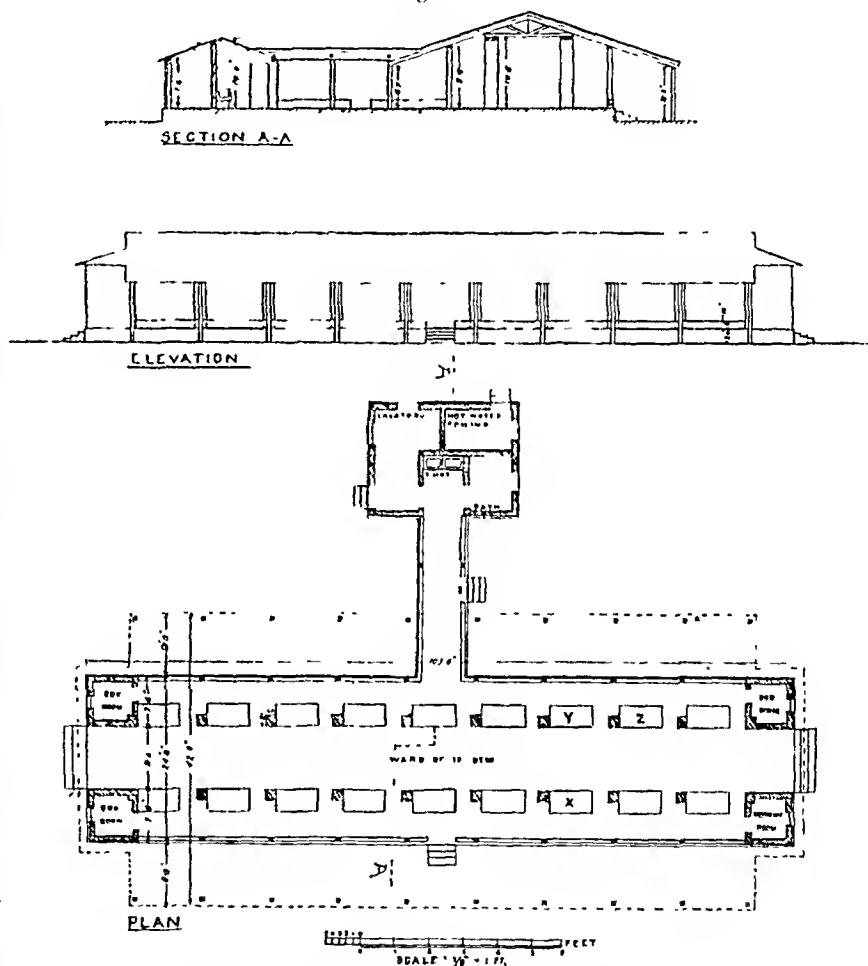
without equipment is about Rs. 3,000 in South India.

This is a larger but single ward with still more accommodation the construction of which costs only a little less than that of the double one.

The above wards are specially suitable for South and Central India, but in the extreme North more protection against the extremes of climate may be required.

(iii) *Administration building.*—This may be in one large building or it may be found more

Fig. 4.

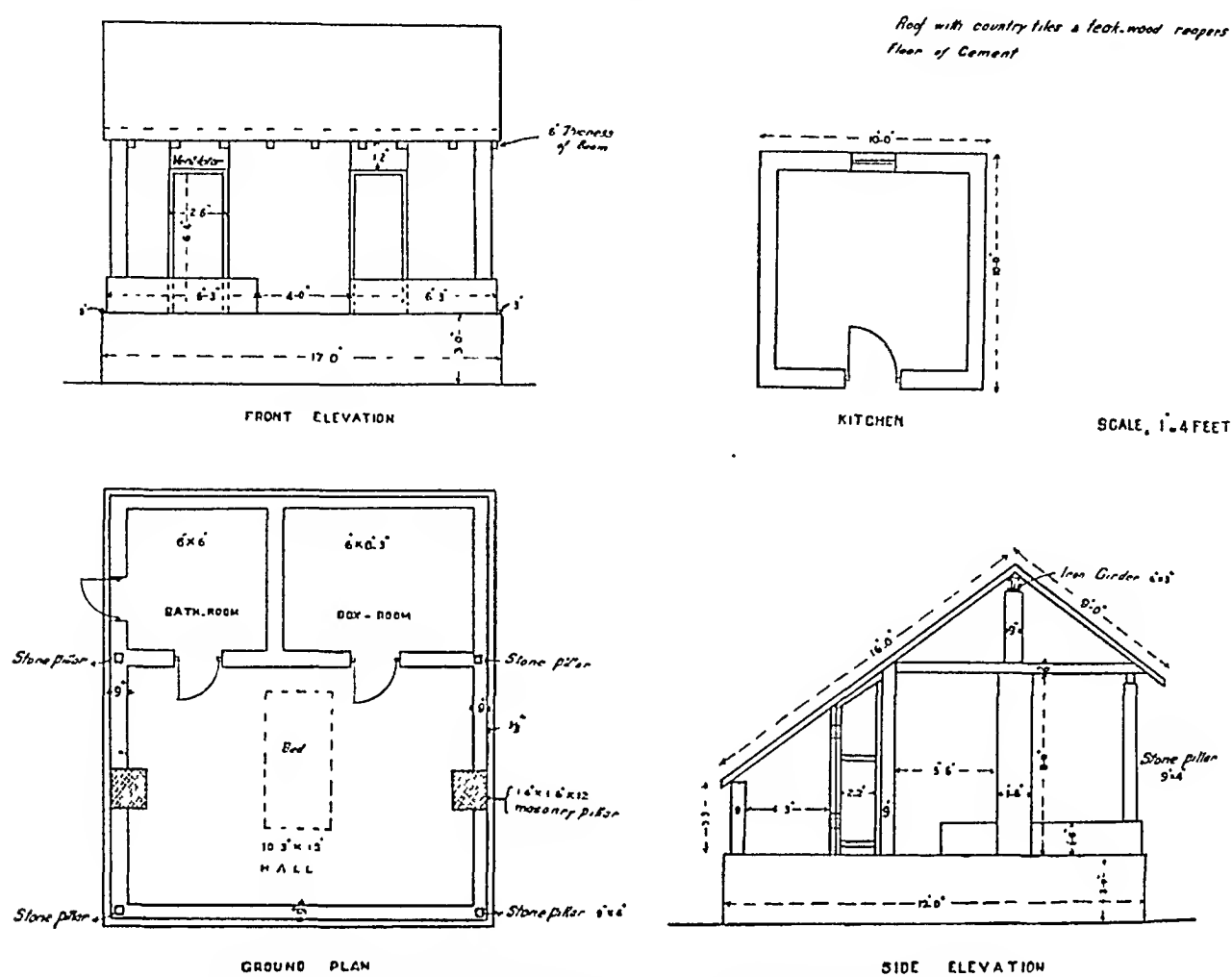


Union Mission Tuberculosis Sanatorium, Arogyavaram, Chittoor District near Madanapalle. Ward of eighteen beds.

convenient to separate some of the sections, varying with the local conditions, ground available, etc.

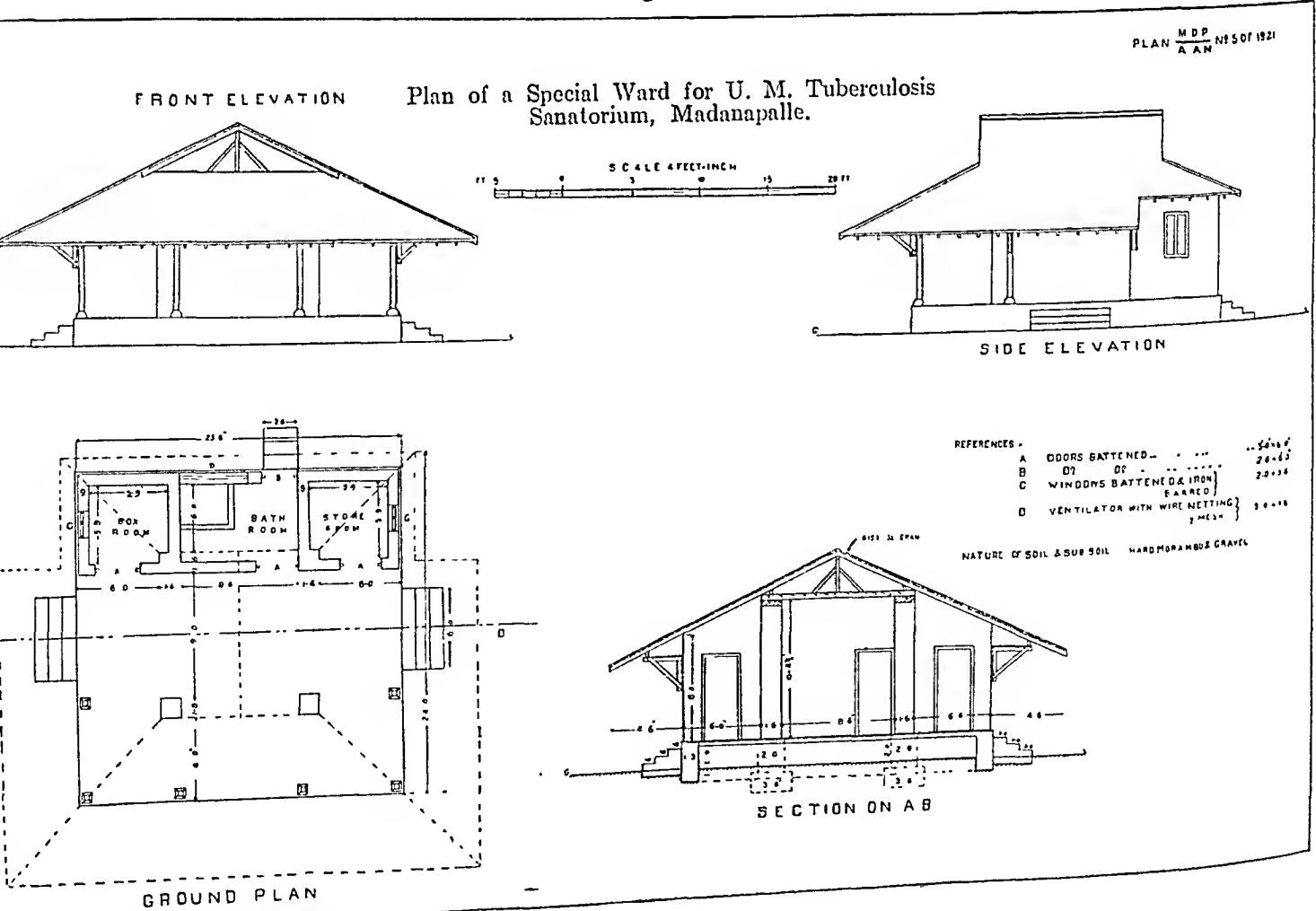
The examination room and x-ray room should, however, be kept together, as in modern methods of examination of tuberculous patients it is found most convenient to be able to screen during the examination. There should be made provision therefore to darken the examination room with curtains and the doctor to work in electric light so that his eyes will be accommodated to the screen without delay. The room for screening must have an efficient ventilation system and must be so constructed that it can

Fig. 5.



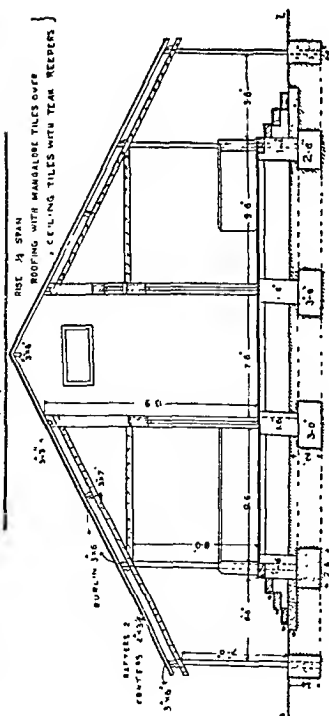
Union Mission Tuberculosis Sanatorium, Arogyavaram near Madanapalle.
Small special ward of light construction.

Fig. 7.

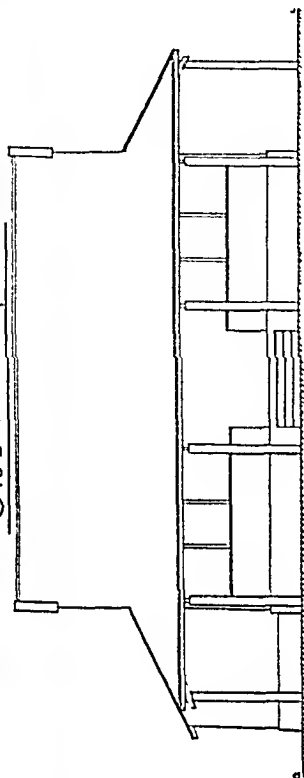


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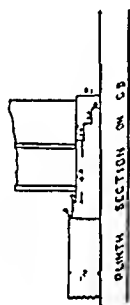
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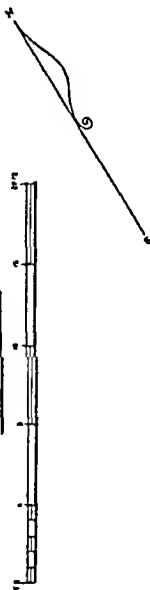
Side Elevation



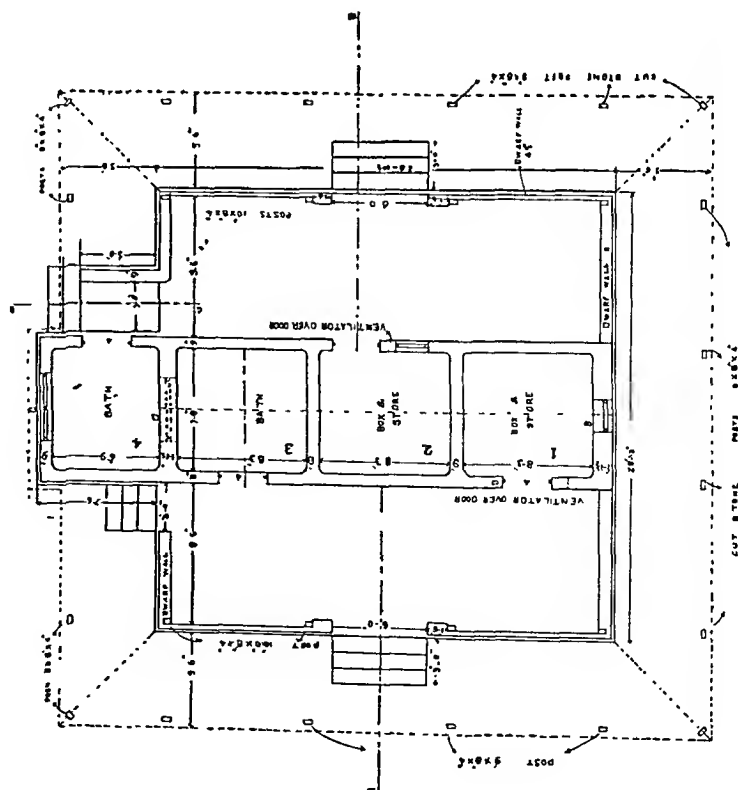
Plan of New Double Ward at Sanatorium Madanapalle.



SCALE 4 TO 1



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be completely opened up when not in use. In order that the accommodation of the doctor's eyes may not be spoilt for screening when patients enter or leave the room, there must be provided a dark ante-room. If the *x*-ray room is used for stethoscopic examination also, the *x*-ray machinery must be far enough away so as not to cause disturbance by noise.

In considering the laboratory, it should be understood that modern tuberculosis work requires a good many examinations, and the laboratory should be made large enough and have room for media preparation and sterilizing as well as for the usual examinations of sputum, blood, urine and stools.

The operation room should not have direct access from a corridor nor from outside but through some ante-room. It should also be capable of being darkened for thoracoscopic examinations. There should be two post-operation rooms as patients after a major operation, such as thoracoplasty, cannot be nursed in the general wards during the first few weeks. These rooms should also be used for patients after less serious operations, such as thoracoscopy, for a short period of about 24 hours, so that bleeding or any other complication may be quickly controlled. There should be access from these rooms to the *x*-ray, either direct or by a covered passage, so that the *x*-ray may be quickly and easily used for diagnosis or confirmation in the event of any complication occurring after operation.

Provision should be made for a medical library and record room, in addition to the other office facilities.

(iv) *Sanatorium or hospital grounds.*—The site selected must not be too small as there must be sufficient room for walks for patients, preferably separate for men and women, as the graded exercises, alternating with rest in bed, constitute the most essential part of the whole treatment.

The site should also be such as to allow expansion of the institution, should this be later needed. This possibility should be taken into consideration in planning the lay-out of the institution. For example, staff-quarters should not be built in a place where if the institution expands the new wards ought naturally to be placed, and special wards should not be built where general wards should later be located.

The distance between staff-quarters and the wards should not be less than 100 to 150 feet, both for the sake of privacy for the staff and also for quietness for the patients. If space allows the distance should be considerably more.

In locating the building it should be remembered that it might be necessary in later years to enlarge the administration building, and other buildings such as store rooms and kitchens; therefore sufficient space must be left so that if the extension is made, the buildings will not be cramped together preventing sufficient light and air access. Such extensions should also be borne in mind when roads are constructed,

avenues planted and gardens laid out. Well-laid-out avenues and groups of trees add much to the freshness of the air and protection from dust and give the necessary shade for outdoor life, while the beauty of flower beds has its share in encouraging the patients.

(v) *Staff-quarters.*—Details of staff-quarters cannot be given here but it must be remembered that sufficient medical and surgical staff must live in the grounds of the institution or very near at hand to be ready for emergencies which so often arise in this disease.

Ex-patients' colonies

Ex-patients' colonies are now more and more being recognized as an essential part of a successful tuberculosis scheme, but they should grow out of a sanatorium or tuberculosis hospital and be closely connected with it. The reason for this is that many of the ex-patients still need experienced medical supervision and care, in order to adjust the work to the capabilities of the ex-patient from the point of view of his health. Such an arrangement also gives an ex-patient confidence as he knows that skilled medical aid is at hand if required.

It is impossible to go into details about the planning of an ex-patients' colony as so much depends on the local conditions, the site available, the funds in hand and the work and industries chosen. But one thing can be said in general with regard to ex-patients' colonies in India, and that is that the planning of such colonies can be done on a far cheaper scale than in Europe and still have the desired result. The types of houses can be very simple, even of the ordinary village type modified for the purpose only by having partly open walls or large windows protected by wire netting, and with *pucca* floors. In addition to having the advantage of cheapness, they have the advantage that those who originally came from villages, if they later go back there, learn that they can live under village conditions and keep well. It is preferable to have a separate house for each member of the colony.

Conclusion

In conclusion, it is worth while remembering that in planning a campaign in India due consideration must be paid to already existing institutions, even if they are not ideal in construction from the modern standpoint. In many cases it should be possible to adapt, modify or reconstruct them so that they can be useful and thereby save considerable capital expenditure. Therefore, it is only right that existing institutions should review their plant to see if it fulfils requirements for effective work. In this the new Tuberculosis Association of India should be of greatest help as it can make available for all the experience of each, so that by general co-operation all may benefit and the whole standard of work and the means by which the work is done may be improved and be made more effective in tackling tuberculosis in India.

Indian Medical Gazette

SEPTEMBER

THE SPECIAL TUBERCULOSIS NUMBERS

THIS is the third year in succession on which we have issued a special tuberculosis number. It has always been the policy of this journal to maintain its 'general' nature in each number, and only in special circumstances to issue 'special' numbers. Special circumstances have, in our opinion, arisen.

Our reasons for issuing these special tuberculosis numbers are threefold. An organized and concerted effort is now being made by the whole nation to check the spread of tuberculosis, a disease which has hitherto not received the attention that its seriousness deserves, and we wish to play our part in this movement. We wish to emphasize the gravity of the position, that is, the extent to which the disease has spread amongst the population (this is well shown in the paper of Dr. Benjamin and his co-workers in this issue), to spread the knowledge that has been acquired by tuberculosis workers in this country on the methods of diagnosis and treatment, and on the organization for the control of the disease that are applicable in, and most suited to the needs of, this country, and at the same time by giving extracts from foreign journals to indicate some of the more important advances that are being made in our knowledge of tuberculosis in other countries. We have been particularly fortunate in being able to include amongst our contributors Professor Lyle Cummins who has not only acquired a great reputation as a phthisiologist in Great Britain but has made a special study of the disease in tropical and subtropical conditions; he was adviser to the South African tuberculosis research committee and later he visited Burma. He adds further support to the view already expressed by Indian workers that amongst many of the communities in India tuberculosis is a comparatively new experience; this means, as we have said before, that one cannot translate literally the knowledge gained by workers in other countries and apply it in India: considerable adaptation will in most instances be necessary before this can be applied in this country and therefore research must form part of any programme for the control of tuberculosis in India.

Lady Linlithgow's appeal, which was closed in the early part of this year, was a great success from two points of view: in the first place, a large sum of money was collected which will help to lay the foundations of a widespread anti-tuberculosis movement in India, and, secondly, the appeal focussed attention on tuberculosis, it made the whole population—ministers, members

of the assemblies, urban corporations, and district boards, village headmen, employers of labour, heads of families, and all who carry any responsibility for the health of others—tuberculosis-conscious. A perhaps not unnatural reaction to the enthusiasm of the early days of the launching of the appeal is now appearing and the people who helped to raise the fund are asking how the problem is going to be tackled, some in an interested and helpful spirit, others querulously and with a suggestion of hopelessness. 'What is the good', the latter say, 'of pointing to the successful campaigns in other countries, countries that are able and prepared to spend hundreds of pounds per tuberculosis death on sanatoria and tuberculosis hospitals, when we cannot afford as many pice for this special purpose?' But we shall not tackle the problem on the lines that they are doing it in western countries and we should not do so even if we had the necessary resources; we shall devise means suited not only to our limited resources but to the special conditions of the country. Whilst the balance is certainly in favour of the richer western countries, we have some factors that work in our favour, the sun, for example, and the relatively small proportion of our children that live under the conditions comparable to those of the grinding poverty and squalor of the overcrowded, sunless slums of many large European cities.

The control of the disease is so closely associated with the treatment of the existing cases that one cannot dissociate the two ideas. The anti-tuberculosis programme will of course include the building of sanatoria, up-to-date and well-equipped dispensaries, and after-care settlements, to act as models and to show what can be achieved under the most favourable conditions, but in such institutions, as with the funds available we could hope to found, scarcely one per cent of our patients could be accommodated, and we shall certainly not be content to leave matters there: something must be done for the remaining 99 per cent, and tuberculosis dispensaries, conducted on more modest but still we hope up-to-date lines, will have to be established, not only in every province and district but eventually in every *thana* or *taluk* in the country. This will be one of the problems to be solved by the conference of tuberculosis workers which is to be held probably in November this year in Delhi. Another very urgent problem which we hope will be discussed at this conference is the possibility of protecting the *mofussil*-bred recruit to industrial and urban areas where he is liable to contract, and living under unfavourable conditions to fall an early victim to, tuberculous infection. They should, we think, consider the possibility of using BCG vaccine for this purpose, but any experiments in this direction will have to be conducted cautiously and under the expert advice of a trained research worker who will see that the necessary conditions for the proper

assessment of the result of such an experiment are observed.

There is a tendency on the part of the medical practitioner to adopt a helpless attitude in the face of a diagnosis of phthisis and our second reason for publishing these special numbers is to show him that a very great deal can be done in the treatment of the individual case. What artificial pneumothorax did to improve the prognosis in the early and uncomplicated case a few years ago, thoracic surgery is achieving to-day in the more advanced case, and, although in these times of almost daily advances in chemotherapy no specific has yet been found, the outlook of the tuberculous patient is steadily improving.

The general public will take their tone, their attitude of hopefulness or helplessness, largely from the medical opinion of the day, and it is therefore important that medical practitioners throughout the country should have a proper appreciation of what can be done for the tuberculous patient in order that they may convey this spirit of hopefulness not only to their patients, and this of course is a very important matter, but also to the whole population, as in a problem of this kind general co-operation and support is essential.

Lastly, our third reason for publishing these special numbers is that we were offered the assistance and advice of an expert committee of the Tuberculosis Association of India in collecting and selecting the material for publication. For this number the committee consisted of Dr. C. Frimodt-Møller, Dr. A. C. Ukil, and Dr. B. K. Sikand, the secretary of the association. Though in principle the editor has the last word in the matter of selection of material for inclusion, in this number, we accepted the selections of the committee *in toto*, with the single reservation that if there was not room for all the papers in the special tuberculosis numbers, they would be published in the next issue of the *Gazette*.

The committee wishes it to be made clear that approval of these papers as suitable for publication does not necessarily carry with it approval of the principles enunciated therein. They do not wish the number to represent only their own points of view but rather those of all workers in India who by their position and achievements can be considered competent to express an authoritative opinion. It should perhaps be added that the function of the committee ceased when they forwarded the papers to us; the work of arranging and 'editing' the material was naturally left entirely in our hands.

The two previous special tuberculosis numbers have not only been very popular in this country (this has been shown by the number of extra copies that have been sold), but have attracted considerable attention outside India and we have received a number of appreciative letters regarding them from prominent tuberculosis workers

in other countries. This success would be quite impossible without the wholehearted co-operation of others and the editor take this opportunity of thanking the individual contributors, the editorial committee of the Tuberculosis Association of India—especially Dr. Ukil to whom he has appealed repeatedly for advice on technical points—and the publishers of this journal who have generously allowed us a considerable number of extra pages in this issue, for their co-operation in the preparation of this year's special tuberculosis number.

L. E. NAPIER.

'TUBERCULAR' AND 'TUBERCULOUS'

THE English language is not static. Words and phrases that are 'correct' to-day may be 'incorrect' to-morrow, or fifty years hence. So that when one uses the word 'correct' in this connection one should add the date and say 'correct in 1939', or it is perhaps safer to avoid the word 'correct' altogether and say 'current English usage'. Whilst this is true of the English language in general, it is particularly applicable to 'medical' language. Almost daily a discovery is made that may necessitate the introduction of a new word; there are other medical advances that make words meaningless or alter their significance completely, so that a well-established word may become obsolete over-night.

Prior to 1882 the adjectives 'tubercular' and 'tuberculous' were used more-or-less synonymously and meant 'consisting of or of the nature of tubercles'. In 1882 the tubercle bacillus was discovered, and it was found that while some 'tubercles', tubercular or tuberculous lesions, were caused by the tubercle bacillus, others were not, and by common consent the two adjectives took on different meanings.

The adjectival suffix *-ar*, from the Latin *-aris*, carries the meaning, 'of the kind of', 'of the form of', whereas *-ous*, from the Latin *-osus* implies rather 'of the nature of', so the former was applied to lesions consisting of or of the form of or covered with tubercles or nodules, and the latter was reserved for specific lesions caused by the then-newly-discovered tubercle bacillus, now known as *Mycobacterium tuberculosis*. Thus, we have 'tubercular syphilides' and 'tubercular leprosy', nodular lesions caused by the organisms of syphilis and leprosy, respectively, but 'tuberculous ulcers' and 'tuberculous meningitis', caused by the specific organism of tuberculosis. To obviate misunderstanding, it is surely better, where there are two words each of which might convey two meanings, to reserve one word for one meaning and the other word for the other meaning. Whilst this special use of these two words does not rest on an unassailable etymological basis, there can be no objection to it on etymological grounds and what is far more important these words have the sanction of established usage.

However, there are many writers who do not observe this distinction but use the two words indiscriminately, often alternating them by way of 'elegant variation'. This we think is a pity and, in this journal, whenever the writer's meaning is clear we use our editorial privilege and alter the suffix to conform with 'current English usage'.

We have not taken this step without reference to authority. We feel that we could not do better than appeal to the *Oxford English Dictionary*. The following are relevant quotations from this authority :—

TUBERCULAR

1. *Nat. Hist.*, etc. *a.* Of the nature or form of a tubercle. *b.* Having or covered with tubercles, tuberculate.

2. Of, pertaining to, caused or characterized by, or affected with tubercles.

Allbutt's Syst. Med. VIII, 805 Tubercular syphilide—the term tubercular used above refers solely to the gross infiltration of the skin causing raised nodules, and has no relation to the tubercle-bacillus.

b. spec. In reference to tuberculosis, or the tubercle bacillus; now technically replaced by *tuberculous*, *q.v.*

But as the discovery of the bacillus was made known only in 1882, the earlier examples of the word, though actually descriptive of the results of the action of the bacillus, did not refer to it, but to the presence of tubercles.

TUBERCULOUS

1. *Path.* Pertaining to or produced by tubercles; consisting of or the nature of tubercles; affected with tubercles.

2. Since 1882, almost always used *spec.* in reference to the tubercle bacillus, or to tuberculosis, and thus technically distinguished from *tubercular* in the general sense.

We also quote Stedman's Medical Dictionary, as a second, technical authority :—

Tubercular. 1. Relating to or marked by tubercles or nodules on the skin or in the tissues, tuberculated, nodular. 2. Tuberculous. *t. leprosy*, see under *leprosy*. *t. syphilide*, cutaneous gummata.

Tuberculous. Relating to or affected by tuberculosis. It is the better practice, following the analogy of the Latin termination *-aris* and *-osus*, to restrict the term *tubercular* to conditions marked by the presence of (non-specific) tubercles or nodules, reserving *tuberculous* for conditions marked by an infiltration of (specific) tubercle, thus we may speak of *tubercular*, or nodular, leprosy, and *tuberculous* disease of the skin, or lupus.

KING GEORGE THANKSGIVING (ANTI-TUBERCULOSIS) FUND

A REVIEW OF THE ACTIVITIES FOR THE YEAR 1938-39. BY DR. B. K. SIKAND, M.B., B.S., D.P.H.

THE 1938 report of the King George Thanksgiving (Anti-Tuberculosis) Fund on tuberculosis work in India was the last report to be issued by that body. The Fund was along with King-Emperor's Anti-Tuberculosis Fund incorporated into the Tuberculosis Association of India on the 23rd February, 1939. The setting up of the central and provincial state tuberculosis associations as a result of Her Excellency's appeal has given a renewed life to the whole campaign against tuberculosis and marks a new and a very important step forward in tuberculosis activities in India. Those who have been responsible for the administration of the King George Thanksgiving (Anti-Tuberculosis) Fund

since its inception in 1931 will find in this new development the fulfilment of their desire for a more effective control of tuberculosis in India. The Fund continued to follow its established policy of organizing the training of workers, providing propaganda material, helping educational campaigns, while it maintained an information bureau, and co-ordinated preventive activities in the provinces. The following is a summary of the activities of the Fund for the year 1938:—

HER EXCELLENCY THE MARCHIONESS OF LINLITHGOW'S APPEAL FOR THE KING-EMPEROR'S ANTI-TUBERCULOSIS FUND

The most important feature of the year so far as tuberculosis in India is concerned was the successful result of Her Excellency's appeal. The collection of funds has been associated with such a wide educational campaign that 1938 will be remembered as a special anti-tuberculosis year. At headquarters the closest co-operation was maintained with the appeal office. A grant of Rs. 1,000 was given by the Fund committee for showing the 'Papworth Film' and in the provinces and states all the provinces and states sub-committees helped a great deal in the propaganda for the collections of funds.

THE TUBERCULOSIS ASSOCIATION OF INDIA

Preparations were made in 1938 for the formation of a Tuberculosis Association in India. At the request of Her Excellency the Marchioness of Linlithgow the King George Thanksgiving (Anti-Tuberculosis) Fund appointed two sub-committees: (1) a technical committee of medical men with expert knowledge of the tuberculosis problem in India, and (2) a constitution-drafting committee to consider the policies and planning of the proposed All-India Tuberculosis Organization to be formed as a result of the King-Emperor's Appeal. The technical recommendations on being accepted by the Fund committee were submitted to Her Excellency and issued from the appeal office as a note on the tuberculosis problem in India for the guidance of provincial organizations. The proposed constitution for the central and provincial tuberculosis associations was later in consultation with the provincial authorities approved by Her Excellency and the Tuberculosis Association of India was legally registered on the 23rd February, 1939.

TRAINING OF TUBERCULOSIS WORKERS

Forty-five doctors were selected out of 300 applicants and received training at two courses held at the All-India Institute of Hygiene and Public Health, Calcutta (January-February 1938), and Mayo Hospital, Lahore (November-December 1938). The selection was as far as possible equitably distributed over the different provinces and states and due regard was paid to the candidates' past experience in tuberculosis. As in previous years no admission or tuition fees were charged and the Fund paid the out-station candidates single return second-class fare up to a maximum of Rs. 100.

The greatest difficulty of preventive work for the tuberculosis clinic is the lack of properly trained tuberculosis health visitors. The Fund tried to meet this difficulty by organizing a special six months' course at Delhi with the help of the Silver Jubilee Tuberculosis Hospital and the Lady Reading Health School. Though in theory it was agreed that fully-qualified nurses with special training in tuberculosis are essential for this work it was nevertheless necessary in the peculiar conditions in India where trained nurses are not available for this work, to select 10 matriculate candidates over 21 years of age out of 17 applicants. The course opened on the 16th January, 1939. The candidates received Rs. 20 per mensem with free furnished quarters but the employment and pay of the candidates is a matter left entirely to the provinces and states who deputed them for training.

EDUCATIONAL ACTIVITIES

The education of the public in regard to the causation and prevention of tuberculosis and the

stimulation of individual initiative have been the fundamental objectives of the Fund's educational activities, which have been aided by the excellent publicity campaigns organized by the King-Emperor Appeal Committees.

The provincial and district committees have carried convincing messages to the public through posters, leaflets, health exhibitions, health songs, whereas a wider range of education has been provided by the radio from some centres.

The educational activities from the centre have been directed mainly towards creating contacts with and stimulating interest of individuals and organizations interested in public welfare. It was emphasized during this year that the best way of attracting public opinion is through the educated section of the community and that short special courses are a very useful form of activity. Short courses on tuberculosis among organized groups, like teachers, university students, St. John Ambulance Brigade, Overseas Divisions, and nurses have been organized with the help of the authorities concerned and all necessary help was given from the Fund's headquarters.

The Fund maintained a stock of suitable educative material in various languages. Ten thousand two hundred and twenty-six pamphlets and leaflets and 8,678 posters and charts were distributed free through educational institutions, public libraries, maternity and child-welfare centres, health exhibitions and other social organizations. Sales of stocks registered a marked increase, 11,273 pamphlets and 53,506 posters and charts being sold as compared with 4,166 pamphlets and 14,014 posters and charts in 1937.

The following new literature was issued during the year:—

1. 'What a Teacher should know about Tuberculosis', in English, Urdu and Hindi.
2. 'Prevention of Tuberculosis', in Hindi.
3. 'A dangerous teacher and the lessons he teaches about Tuberculosis', in English.

Twenty-one slides were sold and the educational films in tuberculosis were in great demand. Closest co-operation has been maintained with organizations like the maternity and child-welfare bureaux, women social organizations, life insurance companies, who were interested in tuberculosis work in their own sphere of activities and all these have been very good allies in our cause.

CO-ORDINATION OF PROVINCIAL ACTIVITIES

To meet the difficulty of early diagnosis of open cases amongst poor patients the Fund committee approached the local governments through its provincial/state committees, to provide free sputum examination facilities for poor patients on the recommendation of a qualified medical practitioner, at all public health laboratories and district and taluq hospitals. The Government of India was also requested to commend this proposal to all provincial governments. The governments of Madras, Assam and Sind have accepted this proposal and have issued orders accordingly. In Delhi, Baroda, Jodhpur and Ajmere-Merwara arrangements already exist where facilities for examination are available. It is expected that other Provincial Governments will also accept this proposal.

SPECIAL TUBERCULOSIS NUMBER OF THE 'INDIAN MEDICAL GAZETTE'

As in the previous year, the *Indian Medical Gazette* published a special tuberculosis number; in this matter they were assisted by a publication committee of the King George Thanksgiving (Anti-Tuberculosis) Fund who collected and selected the papers for the special number. This contained articles by prominent tuberculosis workers in India dealing mainly with the prevention of the disease and the methods which are being or might be adopted to deal with this problem in India. This proved very popular and was very welcome at a time when the subject of tuberculosis was of absorbing interest, not only to medical men but to all concerned with India's welfare.

HASSAN MASUD SUHRAWARDY MEMORIAL ANTI-TUBERCULOSIS CHALLENGE SHIELD

The shield competition which is organized to stimulate interest in anti-tuberculosis organizations, received 9 entries against 5 entries last year. The shield was awarded to Delhi for the best anti-tuberculosis efforts made in 1937.

INTERNATIONAL UNION AGAINST TUBERCULOSIS

The Fund continued to be a member of the International Union and maintained the closest co-operation with its activities. With the help of the Union Dr. B. S. Ramanna, the Fund's nominee, was selected for a scholarship at the Carlo Forlanini Institute. This is the third occasion on which a nominee from India has been selected for this foreign scholarship, the previous awards being made in 1933 and 1934.

A new relationship was established with the Imperial Bureau of the Empire Conference on the Care and After-Care of Tuberculosis. The objects of this body are:—

- (1) To supply and receive information on tuberculosis activities.
- (2) To help visitors with information and introductions for a study of tuberculosis.

Several nominees from the provinces took advantage of these facilities.

ORGANIZING SECRETARY'S TOURS

The organizing secretary toured the Central Provinces, Assam, and the Punjab. He addressed several meetings and met medical and public health authorities and stressed the urgency and need for active and sustained measures for the prevention and control of tuberculosis. He also met railway, and tea and oil industry authorities and suggested schemes suitable for the need of each area and discussed in detail the line which would give a new orientation to the existing medical machinery towards preventive efforts against tuberculosis.

PROVINCIAL AND STATE BRANCHES

The sixteen provincial and state branches received various grants from the centre aggregating to Rs. 25,500. The reports from these bodies show a good progress in educational and preventive campaigns in general. The running of tuberculosis clinics has come to occupy a prominent place in the activities of the active branches. When the Fund started activity in 1930 only a few clinics existed in India. The Fund has helped the opening and maintenance of such clinics in a few provinces and states. There are now 60 such clinical units working, spread over India. The reports from some are very heartening and are excellent illustrations of the success which can be achieved by tuberculosis clinics.

Special Article

THE PROGNOSTIC IMPORTANCE OF BLOOD EXAMINATIONS IN PULMONARY TUBERCULOSIS

By R. M. BARTON, M.A. (Oxon.)

Pathologist, Union Mission Tuberculosis Sanatorium, Arogyavaram, near Madanapalle, South India

A GREAT many blood examinations may be done for tuberculous patients, but only a few of them are of real value from the point of view of prognosis and guidance during treatment. Examination of the hæmoglobin content of the blood, of the number and condition of the red cells, examinations for malaria parasites and for syphilis, are important and, wherever possible,

should have their place in the cure of the tuberculous, as the treatment of a complication has often a great influence on the progress of a patient, but all these examinations are not directly connected with the disease of tuberculosis, nor do they show anything of the progress of the disease. Even the absolute white cell count is of little help, as the majority of patients show figures coming within the normal range, and usually only the most advanced patients with considerable cavity formation show any marked and significant increase. Modern work also shows that there are considerable variations in the total number of white cells in the peripheral circulation even during a single day.

Sedimentation test and differential counts

There are, however, two examinations which are of the utmost importance: the sedimentation reaction and the differential count. It is admitted that neither of these is specific for tuberculosis, and they can, therefore, by themselves not be used to establish a diagnosis, but in the absence of other ascertainable disease they may strongly suggest a tuberculous condition, and when tuberculosis has been diagnosed can provide the physician with a wealth of information about the condition of his patient, specially when the examinations are made at fairly frequent intervals.

The sedimentation test has been carried out in our laboratory since 1926, at first only on admission of a patient, and occasionally later during treatment, but as its usefulness came to be more understood, regular monthly examinations came to be made for all patients.

A routine differential count was begun for all patients on admission in 1925, using Ehrlich's classification of cells, but this count proved disappointing in the help it gave. There was a small amount of prognostic information gained, as a study of a group of 1,700 tuberculous patients showed a gradual increase of neutrophils and decrease of lymphocytes with the

in the neutrophils. Apparently the reserve of mature neutrophils in the body is rather small, and whenever there is a sudden call for more, due to disease or injury, young or immature neutrophils are produced rapidly in the bone-marrow and sent out into the circulation. Therefore, an examination of the neutrophils, with regard to age, was interpreted as being able to show the severity of the strain on the body caused by the disease or injury, a 'shift to the left', i.e., an increase of less mature cells being interpreted as an adverse sign, and 'a shift to the right', i.e., an increase in the more mature cells as a good sign. The original Arneht count is not much used now, but a modification of it has been advocated by some tuberculosis workers, e.g., Houghton (1932) called the von Bonsdorff count, in which the total number of lobes are counted in 100 consecutive neutrophils, the normal average being about 270.

Schilling differential count

Other workers have found the Schilling count to be not only simpler and time-saving, but also to give information just as good as the Arneht or similar counts. In the Schilling count, the neutrophils are divided into segmented and non-segmented groups, the latter group being subdivided into three: so there are

- (i) segmented neutrophils,
- (ii) non-segmented neutrophils,
 - (a) stabkernige or stabzellen,
 - (b) metamyelocytes or jungkernige or jugendformen and
 - (c) myelocytes.

Metamyelocytes and myelocytes are not normally found in the peripheral circulation, although occasional cells may be found in various infections, and under abnormal conditions numbers may be found in tuberculous as well as other diseases. An example will illustrate the value of the Schilling count, as compared with the Ehrlich count:—

		Neutrophils	Stab.	Segmented	Eosinophiles	Mast cells	Lymphocytes	L. mono-nuclears
Ehrlich	..	60	..	..	4	1	29	6
Schilling	..	60	48	12	4	1	29	6

stage of the disease on admission and with the ultimate prognosis as shown by results on discharge, but the variations in each group were so marked that the Ehrlich count could not be used as a guide to prognosis with any great certainty (Frimodt-Møller and Barton, 1933).

It was only in 1930, when we began to study the neutrophils, from the point of view of maturity, that we found in the differential count information of real significance and help in tuberculosis. Arneht was the first to emphasize and attempt to interpret clinically the changes

Judged by Ehrlich's method, the differential count is a good one, but judged by Schilling's method it is a bad one, as 48 out of 60 neutrophils are immature, instead of 3 to 5 (or possibly up to 10), showing that there is a considerable strain on the patient. This is a type of count frequently found in tuberculous patients.

It must be emphasized here that occasional differential counts by untrained workers using the Arneht-Schilling count, or a modification of these, are of little value. The counts should be done by those with considerable experience,

who have reached a standard of judging segmentation of cells, which is not liable to variation.

Technique

(a) *Blood smears.*—The blood smears and the blood for the sedimentation test are taken simultaneously, and in order that a standard technique may be used, the examinations are always made between 9 a.m. and before the main morning meal at 11 a.m., to avoid variations which might be caused by meals, although it is doubtful whether there is really a so-called 'digestion leucocytosis'. The smears are made with the drop of blood from the syringe needle used in taking the sedimentation test. Houghton (1936) showed that smears made from venous blood are less subject to variation than smears made from capillary blood. Thin smears are made on good, clean slides by drawing the blood behind the spreader slide (not pushing in front), holding the spreader slide at an angle of about 30°, and using only light pressure. The smears are made by one member of the laboratory staff. As far as possible, therefore, the conditions are the same for all smears. Leishman's stain is used, and in normal routine examinations 200 cells are counted, and the counting is ordinarily done by one member of the laboratory staff. The method of making a differential count has been a matter of discussion, and different techniques have been suggested to compensate for any possible uneven distribution of leucocytes in the smear. The method used in the writer's laboratory is to take a line from end to end of the smear in three or four parts of the smear, top, middle and bottom; the edges of the smear are not taken, but the end of the smear is included; cells are not counted at the beginning of the smear if they cannot be easily and accurately identified, specially with regard to segmentation of the neutrophils, owing to the smear being a little thick. With the above precautions it has been found in practice that a good and even distribution of cells is usually obtained and that 200 cells are sufficient for normal routine counting.

(b) *Sedimentation test.*—The sedimentation test is carried out according to *Westergren's technique*. Into a 2 c.cm. record, or preferably all-glass syringe, 0.4 c.cm. of sterile 3 to 8 per cent sodium citrate in distilled water is drawn, and blood is then drawn into the citrate solution up to the 2 c.cm. mark, from the median basilic or other arm vein, no tourniquet being used, but only light pressure by the hand of an assistant. This makes a dilution of 4 to 1 of blood to citrate. After making the smear as mentioned above, a little air is sucked into the syringe, and the blood and citrate are well mixed and left in the syringe until the test is set up in the laboratory later in the morning. At that time the blood citrate solution is again well shaken, put into a small test tube and drawn up into a Westergren sedimentation tube marked in millimetres from 0 to 200. The sedimentation tubes are placed vertically in a rack, and after 1 hour the reading is taken of the upper level of the red cells.

If Westergren tubes are not available, 1 c.cm. pipettes graduated 1/100 to the tip may be used, but in order that readings may be comparable the height of the 1 c.cm. column should be about equal in all the pipettes, and preferably about 200 mm.

Blood index in tuberculosis

When the differential count and the sedimentation test are studied in relation to the clinical condition of the patient, it will be found that information they give about the condition of the patient is not always identical, the sedimentation rate (S R) seeming to be a little slower than, for example, the stabkernige percentage in showing any change in the patient's condition. Various methods of assessing the blood picture

have been suggested with a view to obtaining a single figure in which change may be seen at a glance. A tuberculosis index published by Frimodt-Møller and Barton (1933) has been in use in this institution since 1932, and is made up by the addition of four factors, an increase in each of which is generally an adverse sign, and a decrease a favourable sign. The four factors are:—

- (1) Neutrophile-lymphocyte ratio obtained by subtracting the lymphocyte percentage from the neutrophils percentage (N-L).
- (2) Mononuclear-lymphocyte ratio obtained by subtracting the lymphocyte percentage from the large mononuclear percentage (M-L).
- (3) The percentage of neutrophils, which are immature, obtained by dividing the stabkernige percentage by the total neutrophile percentage and multiplying by 100 ($\frac{\text{Stab.}}{N} \times 100$).
- (4) The percentage of sedimentation rate in one hour, using Westergren method ($\frac{S R}{2}$).

The formula is

$$(N-L) + (M-L) + \left(\frac{\text{Stab.}}{N} \times 100 \right) + \frac{S R}{2}, \text{ or more simply } N+M + \left(\frac{\text{Stab.}}{N} \times 100 \right) + \frac{S R}{2} - 2L.$$

This index is not a mathematical assessment of the patient's condition, but experience of its use for seven years in over 18,000 examinations in about 3,400 patients has shown that it is very valuable and generally gives more reliable information about the patient, than any single part of the differential count, or the sedimentation rate, taken by itself.

With this index there is a wide range of readings varying from a normal of about -20 to +20 to a reading of as much as 250 in very advanced tuberculosis. An index of above 150 is usually a bad prognostic sign. A variation of about 10 in the index is not considered of much significance; such a difference can easily be caused by minor and insignificant changes in the percentage of the blood cells (or sedimentation rate) possibly due to technique or to small changes in the patient's condition.

Importance of both differential count and sedimentation test

Many workers employ only the sedimentation test, but much information may be missed if the sedimentation test alone is used, and sometimes it may be even misleading. The following is an illustration of this:—

V. J., woman. Admitted 1st July, 1937. Died 27th November, 1937. Stage III, C.

In this patient, reliance on the S R alone would have given a misleading idea of the patient's condition, but

The x-ray photo showed a slight improvement on 3rd February, 1939, as compared with that taken on

Date of blood examination	Total neut.	Myel.	Jungkern	Stab.	Segm.	Eos.	Mast.	Lymph.	L. mono.	S R	Index
2-7-37	79.0	1.0	1	56.0	21.0	6.0	1.0	7.0	7.0	83	184
2-8-37	90.5	0.0	0	72.0	18.5	2.0	0.5	2.5	3.5	76	207
1-9-37	91.5	0.0	0	76.5	18.0	0.5	0.0	3.5	1.5	50	195
1-10-37	95.0	0.0	0	63.0	32.0	0.0	0.0	1.5	3.5	20	172
15-11-37	90.0	0.5	0	72.0	18.0	0.5	1.5	4.0	3.5	6	169

the condition was not hidden in the differential count. Shortly before death it is not unusual to find the sedimentation reaction failing, but it is unusual to find the failure extending over several months, as here.

Moreover, there are many cases which show a comparatively good sedimentation rate either before treatment begins or more usually soon after treatment is instituted, but whose lesion is still active, as shown by the blood count, clinical condition and x-ray.

Blood examinations in pulmonary tuberculosis treated by non-surgical methods

In patients who are treated by ordinary routine sanatorium treatment, with or without drugs, but without artificial pneumothorax or other surgical treatment, there is usually a rapid improvement in the blood picture, if the treatment is going to have a good result, specially if the blood picture is bad on admission. The following is an illustration :—

S. M., male, aged 12. Admitted 10th April, 1938. Discharged 1st September, 1938. Stage II, B. 'Arrested.' T. B. + (stomach-wash water).

Date of blood examination	Total neut.	Myel.	Jungkern	Stab.	Segm.	Eos.	Mast.	Lymph.	L. mono.	S R	Index
11-4-38	90	0	0	45.0	45.0	1.5	0.0	2.5	6.0	94	188
3-6-38	50	0	0	27.5	22.5	1.5	0.5	44.5	3.5	79	30
6-7-38	57	0	0	26.0	31.0	0.5	0.0	40.5	2.0	19	33
4-8-38	42	0	0	16.0	26.0	11.5	1.5	39.5	5.5	8	11

A patient getting no good result, or whose condition is deteriorating, shows this in the blood, as seen in the following case :—

N. B., woman. Admitted 6th December, 1938. Died 10th March, 1939. Stage III, C.

7th December, 1938, but the blood showed a slight worsening of the patient's condition, and death took place one month later.

When the patient shows a comparatively good blood picture on admission, with an index of below 50, there is often but little change during treatment.

Blood examinations during artificial pneumothorax treatment

Blood examinations are important during the course of artificial pneumothorax treatment as a control of the treatment and as a guide to the continuation or change of the treatment.

A successful artificial pneumothorax is quickly followed by a rapid improvement in the blood picture. The following are examples :—

P. C. S., male. Admitted 16th June, 1938. Discharged 24th September, 1938. Stage III, A. Artificial pneumothorax left begun 24th June, 1938 (see 1st table, p. 576).

In the following case, as there was extensive disease in the upper half of both lungs on admission, artificial pneumothorax treatment was delayed for some months.

N. R. P., male. Admitted 17th September, 1937. Discharged 3rd January, 1939. Stage III, B (see 2nd table, p. 576).

With routine sanatorium treatment sanocrysin was given. The general blood picture did not improve much, only the S R showing reduction. On 23rd

Date of blood examination	Total neut.	Myel.	Jungkern	Stab.	Segm.	Eos.	Mast.	Lymph.	L. mono.	S R	Index
7-12-38	73.5	0.0	0	48.0	25.5	1.5	0.0	20.5	4.5	99	152
11-1-39	70.0	0.5	0	56.5	13.0	2.0	0.5	23.0	4.5	86	153
3-2-39	72.5	0.0	0	49.5	23.0	0.5	0.0	15.0	12.0	91	169
3-3-39	91.5	0.0	0	63.0	28.5	0.0	0.0	4.0	4.5	90	201

February, 1938, artificial pneumothorax was begun on the left side, together with a second course of sanocrysin. This was followed by a gradual improvement of the blood picture, except for an interruption

allowed a little walking, but the examination in February 1938 showed again a set-back; five days later there was a rise of resting temperature to 101°F., and screening on 23rd February, 1938, showed a little fluid.

Date of blood examination	Total neut.	Myel.	Jungkern	Stab.	Segm.	Eos.	Mast.	Lymph.	L. mono.	SR	Indcx
17-6-38	76	0	0	42.5	33.5	0.5	0.0	17.0	6.5	26	118
30-7-38	63	0	0	18.0	45.0	1.5	0.0	33.0	2.5	18	37
25-8-38	61	0	0	21.5	39.5	2.5	0.0	33.5	3.0	3	35
20-9-38	54	0	0	22.0	32.0	7.5	0.5	32.0	6.0	14	44

in August, due to a pleural effusion, which began in the middle of July.

The following is an interesting example of a study of the blood in artificial pneumothorax treatment.

T. O. P., male. Admitted 25th September, 1937. Discharged 24th November, 1938. Stage III, B.

After that, both the clinical condition and the blood picture improved rapidly, and the patient was discharged as 'much improved'.

The following is an example of only a little improvement being effected by an artificial pneumothorax, due to the presence of adhesions, but rapid improvement following a thoracoscopy and cauterization of the adhesions.

Date of blood examination	Total neut.	Myel.	Jungkern	Stab.	Segm.	Eos.	Mast.	Lymph.	L. mono.	SR	Index
17-9-37	68.0	0	0	48.5	19.5	0.5	1.0	24.0	6.5	75	136
16-10-37	73.0	0	0	58.0	15.0	1.5	1.5	20.0	4.0	58	146
1-11-37	75.0	0	0	42.0	33.0	2.0	0.0	15.0	8.0	43	131
23-11-37	68.0	0	0	36.0	32.0	1.5	1.0	23.0	6.5	52	108
12-12-37	86.5	0	0	32.5	54.0	0.0	0.0	8.5	5.0	35	130
24-1-38	63.5	0	0	38.0	25.5	2.5	0.5	26.0	7.5	22	90
21-2-38	84.5	0	0	38.0	46.5	1.5	0.0	10.0	4.0	32	130
23-3-38	79.5	0	0	33.5	46.0	1.0	0.0	11.5	8.0	22	118
21-4-38	75.0	0	0	35.0	40.0	1.5	1.0	17.5	5.0	11	37
28-5-38	76.5	0	0	26.5	50.0	0.5	0.0	19.0	4.0	6	81
* 11-8-38	66.0	0	0	34.0	32.0	2.0	0.0	29.5	2.5	80	101
1-9-38	62.5	0	0	18.5	44.0	1.0	0.0	30.5	6.0	34	55
* 14-12-38	58.0	0	0	25.0	33.0	1.0	0.0	31.0	10.0	4	51

* Intervening examinations with no important changes omitted for the sake of space.

Date of blood examination	Total neut.	Myel.	Jungkern	Stab.	Segm.	Eos.	Mast.	Lymph.	L. mono.	SR	Index
27-9-37	63.5	0	0	28.5	35.0	15.5	1.0	15.5	4.5	70	118
26-10-37	52.0	0	0	25.5	26.5	19.5	2.5	18.0	8.0	60	104
25-11-37	69.5	0	0	25.0	44.5	12.5	1.0	11.5	5.5	55	115
22-12-37	72.0	0	0	31.5	40.5	21.5	0.5	3.5	2.5	55	139
21-1-38	50.5	0	0	21.0	29.5	17.5	3.0	20.0	9.0	40	81
17-2-38	59.5	0	0	33.5	26.0	16.5	0.0	18.5	5.5	49	109
15-3-38	57.0	0	0	20.0	37.0	11.5	0.0	30.0	1.5	35	51
20-5-38	52.0	0	0	11.0	41.0	14.0	1.0	31.5	1.5	14	19
* 8-11-38	44.0	0	0	14.0	30.0	20.0	0.5	32.0	3.5	10	21

* Intervening examinations with no important changes omitted for the sake of space.

Artificial pneumothorax left began 5th October, 1937 (see 3rd table, on this page, below).

Although artificial pneumothorax was continued with apparently plenty of air space, from October to December, after a very slight initial improvement, there appeared to be a set-back. X-ray screening showed considerable bulging of the mediastinum; consequently the pressure in the artificial pneumothorax side was reduced by injecting only 500 c.cm., and later 400 c.cm., instead of 800 c.cm. This was followed by an immediate improvement of the blood picture. Fever disappeared, and the patient was

P. T. A., male. Admitted 6th July, 1937. Discharged 11th September, 1938. Stage III, B (see top table, p. 577).

Artificial pneumothorax was begun on 13th July, 1937. Thoracoscopy and cauterization was done on 21st August, 1937, followed by a slight effusion, which delayed the blood change in the September examination. After that there was rapid improvement.

The blood examinations quickly show if there is development of disease in the contralateral lung during artificial pneumothorax treatment.

The following is such an example in a woman patient who had initial improvement following artificial pneumothorax on right side (see 2nd table, below):—

Before the examination on 3rd March, 1938, the patient was walking 3 furlongs morning and evening, but after that examination he was put to rest, because of the blood change. Five days later, he complained of ano-rectal pain, and examination showed an abscess

Date of blood examination	Total neut.	Myel.	Jungkern	Stab.	Segm.	Eos.	Mast.	Lymph.	L. mono.	SR	Index
7-7-37	81.0	0	0	50.5	30.5	2.5	0.0	10.5	6.0	114	186
6-8-37	59.0	0	0	43.0	16.0	16.5	0.0	16.0	8.5	60	139
3-9-37	63.0	0	0	46.5	16.5	12.0	1.5	19.0	4.5	78	143
4-10-37	56.0	0	0	35.0	21.0	16.5	0.5	22.5	4.5	60	108
* 2-12-37	46.5	0	0	20.5	26.0	25.0	1.5	23.5	3.5	18	57
25-8-38	58.5	0	0	21.5	37.0	9.0	0.0	30.0	2.5	5	41

* Intervening examinations with no important changes omitted for the sake of space.

Date of blood examination	Total neut.	Myel.	Jungkern	Stab.	Segm.	Eos.	Mast.	Lymph.	L. mono.	SR	Index
6-9-38	92.0	0	0	59.0	33.0	0.0	0.0	4.0	4.0	40	171
12-10-38	70.0	0	0	37.0	33.0	10.0	2.0	13.5	4.5	99	150
17-11-38	67.5	0	0	40.5	27.0	6.0	1.0	21.0	4.5	22	101
15-12-38	65.5	0	0	27.0	38.5	5.5	2.0	20.0	7.0	10	79
14-1-39	81.5	0	0	47.0	34.5	4.5	1.5	9.0	3.5	25	137
10-2-39	69.5	0	0	37.0	32.5	6.0	0.5	17.0	7.0	20	106
10-3-39	76.0	0	0	39.5	36.5	3.0	0.0	17.0	4.0	29	113
5-4-39	79.0	0	0	38.5	40.5	2.0	0.5	15.0	3.5	35	120
4-5-39	76.5	0	0	38.0	38.5	6.5	0.5	14.0	2.5	55	128
5-6-39	81.0	0	0	45.0	36.0	3.0	0.0	12.0	4.0	60	147

An x-ray photo in April 1939 showed definite infiltration in the left side; the previous photo at the end of January did not show a change. The change in January was probably due to fluid in the right side, but later, when the fluid was absorbed, there was only a slight improvement in the blood, soon followed by a deterioration, due to disease beginning and spreading in the left side.

Change in blood picture before clinical onset of complications

It can be stated as a general rule that a change in the patient's condition is shown in the blood picture before it is shown in the clinical condition of the patient, or in the x-ray picture. The routine blood examinations at the sanatorium at Arogyavaram are done at monthly intervals. This is a fairly long interval necessitated by the limits of the laboratory staff and consideration for the patient, and therefore frequent examinations do not show the coming complication which may have a rapid onset. But frequently they do; and the following are two examples:—

M. P. B., male. Admitted 8th November, 1937. Discharged 7th September, 1938. Stage II, A.

forming, which was incised and drained on 25th March, 1938. The blood examination showed the change before any clinical symptoms were reported.

The following is an example of blood change coming at the beginning of a pleural effusion:—

S. V. C., male. Admitted 12th July, 1937. Discharged 25th March, 1938. Stage III, B (see top table, p. 578).

On 23rd July, 1937, artificial pneumothorax was induced on the right side, and a course of sanocrysin was given during October and November 1937. The blood picture improved steadily until March 1938. The April examination showed a sudden change for the worse, and the patient, who was walking 3 furlongs morning and evening, was kept to the ward, and then 10 days later the patient began not to feel well, and slight fever came. On 22nd May, 1938, x-ray screening showed fluid in the pneumothorax side. After two aspirations the patient improved, as also the blood picture, and walking was again given, finally he was discharged 'much improved'. Here again the blood picture showed a change before the clinical condition.

These particular complications were not prevented by the warning given by the blood

Date of blood examination	Total neut.	Myel.	Jungkern	Stab.	Segm.	Eos.	Mast.	Lymph.	L. mono.	SR	Index
9-11-37	70.5	0	0	31.0	39.5	4.0	0.5	18.5	6.5	29	98
6-12-37	76.5	0	0	25.5	51.0	2.0	0.0	17.5	4.0	8	84
4-1-38	54.0	0	0	19.0	35.0	11.0	0.0	26.5	8.5	9	49
3-2-38	56.5	0	0	7.5	49.0	5.0	1.0	32.0	5.5	7	16
3-3-38	85.0	0	0	35.0	50.0	1.5	0.0	9.0	4.5	11	118
11-3-38	62.5	0	0	31.0	31.5	5.5	0.0	31.0	1.0	15	58
16-4-38	51.0	0	0	5.5	45.5	13.5	0.0	30.0	5.5	16	17

examination, but it is our belief that in some patients a set-back can be prevented by taking notice of such a warning. It is, of course, rather

examinations. On the other hand, steady improvement in the general blood picture can give confidence to the doctor that the treatment is

Date of blood examination	Total neut.	Myel.	Jungkern	Stab.	Segm.	Eos.	Mast.	Lymph.	L. mono.	SR	Index
13-7-37	70.0	0	0	42.5	27.5	10.0	0.0	13.5	6.5	44	132
17-8-37	67.5	0	0	49.0	18.5	5.0	0.0	22.0	5.0	20	112
18-9-37	46.0	0	0	29.0	17.0	15.0	0.5	33.0	5.5	10	54
* 17-3-38	49.5	0	0	5.0	44.5	14.0	0.0	32.0	4.5	15	8
30-4-38	70.5	0	0	25.0	45.5	2.0	0.0	26.0	1.5	24	67
1-6-38	80.5	0	0	19.0	61.5	2.0	0.0	14.0	3.5	46	103
4-7-38	55.0	0	0	19.0	36.0	6.5	0.0	35.0	3.5	12	30
* 21-9-38	41.0	0	0	10.5	30.5	11.0	0.5	43.5	4.0	3	14

* Intervening examinations with no important changes omitted for the sake of space.

difficult to say for certain that such a breakdown would have occurred if, for example, the exercise had not been curtailed, but experience in other cases, where sufficient notice has not been taken of the blood change, leads us to think so.

The following is an example of such a case (also illustrating other changes):—

N. K., woman. Admitted 4th December, 1937. Discharged 20th January, 1939. Stage III, B.

producing satisfactory results, and if the patient is doing graded exercises, they can be continued or increased.

Conclusion

In the blood picture of a tuberculous patient, when both the differential count, using Schilling's differentiation of the neutrophils, and the sedimentation test are employed at regular intervals, there is an extremely valuable aid to the physi-

Date of blood examination	Total neut.	Myel.	Jungkern	Stab.	Segm.	Eos.	Mast.	Lymph.	L. mono.	SR	Index
4-12-37	56.0	0	0	42.5	13.5	11.0	0.5	28.5	5.5	86	125
10-1-38	47.0	0	0	30.5	16.5	15.0	0.0	33.5	4.5	50	75
5-2-38	30.5	0	0	16.5	14.0	19.5	0.0	46.5	3.5	38	15
3-3-38	44.5	0	0	22.5	22.0	28.0	0.0	24.0	3.5	45	74
10-3-38	32.0	0	0	16.0	16.0	26.5	1.0	35.5	5.0	36	34
12-4-38	37.0	0	0	20.0	17.0	27.0	0.5	28.0	7.5	9	47
17-5-38	50.5	0	0	11.5	39.0	9.5	0.0	37.0	3.0	61	34
28-6-38	62.5	0	0	23.0	39.5	9.0	0.0	27.5	1.0	54	72
26-7-38	45.5	0	0	13.5	32.0	18.0	0.5	32.0	4.0	38	35
27-8-38	57.5	0	0	30.0	27.5	9.5	0.0	30.0	3.0	59	82
26-9-38	38.5	0	0	15.0	23.5	20.0	0.0	39.0	2.5	70	37
* 30-12-38	43.5	0	0	20.0	22.5	13.0	0.5	33.0	10.0	48	57

* Intervening examinations with no important changes omitted for the sake of space.

Artificial pneumothorax was begun on 10th December, 1937, and because of adhesions thoracoscopy and cauterizing on 19th January, 1938. This was followed by good improvement shown in the blood, x-ray and clinical condition. On 3rd March, 1938, the blood showed a change to the worse, and screening on that day showed fluid in the pneumothorax side. There was again improvement until June, when the blood again showed a change for the worse. The patient's walking was halved for one month, and the next blood examination showed an improvement. Here the reduction of exercise probably forestalled a temporary breakdown. The change in the blood picture in August was produced by a 'cold' with pain in the chest and throat.

Experience has shown that a change in the blood picture for the worse, other than minor changes, must be treated with respect, and an attempt should be made to ascertain the cause, if possible, by clinical, physical and x-ray

examinations. But the blood picture must be interpreted along with the results of the clinical and physical examinations of the patient, and the x-ray examination, although sometimes it may give information as to the improvement, or the opposite, of the patient, before these other examinations.

Summary

(1) Of many blood examinations done for tuberculous patients, the sedimentation test and differential counts are of special importance as regards prognosis and as a guide during treatment.

(2) Only a differential count in which the neutrophils are sub-divided according to

maturity, is of real value in tuberculous patients.

(3) The technique for Westergren's sedimentation test and the Schilling differential count are given.

(4) A blood index for combining the information provided by the sedimentation test and Schilling differential count is given.

(5) The necessity for doing the differential count as well as the sedimentation test is pointed out.

(6) The value of blood examinations in

(a) Pulmonary tuberculosis treated by non-surgical methods.

(b) Treated by surgical methods is shown with illustrations.

(7) The blood picture shows the onset of complications and usually shows a change in the patient's condition, before the clinical condition or x-ray or physical examination.

(8) In the blood picture made up of the Schilling differential count and the sedimentation test, there is a valuable aid to the physician, to be used along with the other methods of examination of the patient.

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Medical News

PROCEEDINGS OF THE INAUGURAL GENERAL MEETING OF THE TUBERCULOSIS ASSOCIATION OF INDIA, HELD ON THE 29TH MARCH, 1939, AT THE VICEROY'S HOUSE, NEW DELHI

Proceedings

HER EXCELLENCY THE PRESIDENT addressed the meeting as follows:—

It is with a feeling of pride and gratitude that I address you to-day. Pride at the partial achievement of my hopes and gratitude for the help which I have received from all over India. I say partial purposely as I had aimed at a larger sum than the amount collected of over 79 lacs. However, as I have so often said in the last few months, the most important result of my appeal in my opinion is the permanent establishment of the Provincial and State Associations which will be carrying on the work long after my appeal has been forgotten.

My gratitude I give in full measure to the Governments, to the business men, to private individuals, to the Press and last but not least, my most sincere thanks are due to Sir Ernest Burdon, General Bradfield, to Colonel Chamier and to Mr. Badenoch who have been towers of strength to me all through. I support General Bradfield in the hope that the Red Cross who have been so generous and helpful throughout should always keep in close touch with the new Tuberculosis Association. It is no easy job to run an appeal of this magnitude without a certain amount of friction, but I think I can truthfully say that it has been conspicuous by its absence.

When you are dealing with a country of the size of India and when so much has to be done by correspondence, it is inevitable that a few misunderstandings should arise, but I am happy to say that they were of a very minor nature and that it was possible to clear them up with satisfaction to all sides. I think too that it has been abundantly proved that all shades of thought, all political denominations, and all religions can unite for an object which is humanitarian and one where the enemy is a universal enemy. Tuberculosis does not select its victims from the rich, from the poor, from the Hindu, from the Muslim or from the Christian; it attacks the whole community, and therefore the whole population must present a united front. The problem is a big one and is one which must be met in a big way. Do not, I beseech you, in the future let petty differences or individual ambition deter you from your course. Do what you have to do without any thought of personal gain or any wish for reward. Let your reward be the salvation of your people and the elimination of a dread scourge.

It is only in this spirit I feel sure that real progress can be made.

You all have before you a copy of the policy of the Central Association which makes no mention of the after-care settlement so close to my heart. It makes no mention of it as at the moment there is not sufficient money to finance it, but I think most of you know from constant repetition on my part what my dream is. You have many eminent doctors in this country who know a good deal more about the technical side of tuberculosis than I do, but I have seen a good deal in England from my connection with the Papworth Settlement of the psychological side, and it has been borne in on me more and more since I started this appeal how necessary an after-care scheme is. At the moment the anxiety as to what is to become of them when they leave the sanatorium is bound to have an adverse effect on the peace of mind of the sufferers and therefore will retard their recovery. As you can imagine I have a good many letters from tuberculosis patients, some begging me to get them into a sanatorium as they cannot afford the fees, others telling me that they have been discharged and advised to get light jobs and asking me to find them. They realize as we all do that they cannot compete in the open market with healthy men and women, and one is forced to ask oneself what can they do. If we face facts the answer is there—nothing, unless there comes into being a settlement for tuberculous patients where they will be put to a trade and where they can earn a living wage, and where their families can be brought to make a home for them. I know that some people out here think that I am suggesting the impossible, but there are two very eminent doctors—one an Indian and one a European—in this country who think as I do. I do not quote their names as I did not ask them leave to do so and I fear that it might involve them in voluminous correspondence which they would find it difficult to cope with, but they are I know trying to devise ways and means of starting a scheme of after-care.

As to the methods of dealing with tuberculosis through clinics, this is a method which has been universally accepted and is being carried out in many places already with considerable success. A great many more are wanted and will be built with their staffs of doctors and health visitors as occasion arises, and as money is forthcoming and I would like to reiterate the fact that the simplest style of building is all that is necessary and I do deprecate large sums of money being spent on elaborate structures.

The advice of the technical expert at the centre will be available at all times to those who wish for information in this respect. He will be there to help in any way which may be required. You may rest

assured that he will be an expert in every sense of the word as the committee with whom the appointment rests will not be satisfied with anybody but the best.

One of the paragraphs in the papers alludes to the avoidance of duplication of effort. I feel sure that you will agree that this should be avoided at all costs. It is such a waste of money, and the only way that duplication can be avoided is by constant communication between Provinces, States and Centre. I hope that the rules and regulations for the Centre will once for all lay the bogey of interference or control by the Centre. I should like you to look upon yourselves as one large family with the Centre in the position of a parent. When a family grows up and disperses to various corners of the world the parents like to be kept in touch with the lives, the thoughts, the experiences of their family. With the interchange of letters many new ideas and a different outlook on the same subject let in many rays of light to the advantage of both. This is the relationship which I want to see between Centre and Provinces and States. Don't think that it is beneath your dignity to communicate with the Centre or that it is a confession of weakness. The Centre may get much valuable material from the Provinces or States in the same way that they in their turn may get much from the Centre. Co-ordination and good fellowship should be the watchword of the new Association. The half-way mark of my stay in India has been passed, and the time is not far distant when I shall be leaving. I will take with me many happy memories, and perhaps the happiest of them all will be the thought of the foundation of the Tuberculosis Association of India, with the immense possibilities for good which lie before it.

I wish you all the best of good fortune in your endeavours and I ask you to keep always before you the fact that new discoveries and new methods appear very rapidly, and that unless you keep yourselves up to date, you will never achieve the position which I would like you to have in the world fight against tuberculosis.

Major-General E. W. C. Bradfield, C.I.E., O.B.E., K.H.S., I.M.S., Chairman, Central Committee, in making a statement on the present position of the Tuberculosis Association of India said:—

YOUR EXCELLENCY, LADIES AND GENTLEMEN,

It is my duty this evening to make a business statement; to explain the constitution of the Tuberculosis Association of India, and the methods which can be employed to attain its objects.

We have succeeded the King George Thanksgiving Fund, which since 1929 has administered the funds handed over by His Excellency Lord Irwin, to be used for preventive measures against tuberculosis, and we are heirs to the valuable pioneer work of the older organization. The Tuberculosis Association of India was duly registered on the 23rd February under the Societies Registration Act (No. XXI of 1860) and has assumed control of the funds, management and secretarial staff of the King George Thanksgiving (Anti-Tuberculosis) Fund.

The constitution of the new Association has been liberally designed not only to ensure that every use can be made of any recognized activity able to influence the prevention and cure of tuberculosis, but also that Provincial and State Associations may be independent of any central control and may be governed by their own constitution. An important rule (No. 11) of the Central Association provides that all members of Provincial and State organizations and other affiliated bodies are eligible to become members of the Association without payment of any fees, and one of the first duties placed upon the Central Committee was to define this membership in accordance with the proposed bye-laws of the Association. I say proposed bye-laws because they have been left for final confirmation by the full committee which I hope will be in being immediately after this meeting. It is obviously impracticable to have too many individual members of an organization which embraces the whole

of a country the size of India, and at the same time undesirable to fix an arbitrary limit to numbers. After studying the organization and constitution of similar bodies in other countries the sub-committee who examined this problem felt that the method of representation adopted by the International Union against Tuberculosis could be suitably adapted to our requirements. The International Union, in which we succeed to the membership allotted to the King George Thanksgiving Fund, is a federation of 43 independent National Tuberculosis Associations. Each National Association is represented on the Union by two councillor members, though countries with more than 10 million inhabitants are entitled to appoint an additional councillor for each additional 5 million or part thereof, but the total number of councillors for any country cannot exceed five. The position which, I suggest, should be established in our Indian Association is that the members of our central association should be really the Provincial, State or other affiliated bodies themselves acting through their representatives. As these associations may not be legal persons in all cases there is difficulty in making them members as such. It is therefore proposed that this membership shall be exercised by each affiliated body who will appoint or elect two of their members as their representatives, to act for them at any general meeting. They may act individually or under instructions from their association. The condition of affiliation was, as you know, waived in the case of to-day's meeting in order that the meeting might be as representative as possible.

In addition to those members whom I have just mentioned, members of the Central Committee automatically become members of the Association and there are nine foundation members who were signatories to the Articles of the Association, but who will not be members of the committee.

The Central Committee has so far been represented by a few *ex-officio* and co-opted members (the latter retired automatically before to-day's meeting) who, although possessing under the rules and regulations the powers of a full committee, did not wish to take upon themselves more than was essential to put the organization in motion. They have therefore deferred final decision on all important questions till the committee is constituted on a wider basis than at present.

Under (x) it is proposed that five members, three from British India and two from Indian States, shall be elected to the Central Committee by all the affiliated bodies. This election will be arranged by the secretary's office. Each Association will be asked to nominate one member and voting papers will be submitted by post. Under (xi) the Central Committee proposes to co-opt Mr. Mitra, Solicitor to the Government of India, as their legal representative and to utilize the remaining four vacancies to give representation to those Provinces, etc., who do not secure a seat at to-day's election.

When we have completed these elections and co-options the strength of our Central Committee will be 28 (including Her Excellency the President) and I think you will agree that this is a reasonable number.

A note on the policy of the Tuberculosis Association of India has been circulated to the Provinces and States explaining the attitude of the present committee towards the future work. Some of the branches will in the beginning have more need of advice than others? As the organization develops we hope that the Association will work as one co-operative body deriving real benefit from the interchange of ideas and experience among its members.

I need not enter into details because you can read the printed statement for yourselves. Our responsibility is to promote co-operation in all efforts designed to prevent or treat tuberculosis, and by expert advice, propaganda and research to stimulate the interest not only of our affiliated association but of all authorities, whether government, municipal or private. We seek the co-operation of all organizations engaged in promoting public welfare and as Chairman

of the Indian Red Cross Society I should like to mention here that the Red Cross is very anxious to retain a connection with the Tuberculosis Association and in some way to continue an association which has been so valuable in the past. I am certain too that Provincial and State bodies will welcome such a co-operation.

Your Excellency, I desire to offer to you on behalf of the members of the Tuberculosis Association of India our congratulations on the success which has attended your efforts in raising the King-Emperor's Fund and on the inauguration of our new Association and its affiliated bodies throughout India. In these days the only sure thing is the uncertainty of to-morrow, but the Tuberculosis Association has been established with a sound foundation, and with the willing co-operation of which we are assured, we are confident that success will be achieved in attaining the objects for which your vision has schemed.

Mr. A. C. Badenoch, Honorary Treasurer of the King-Emperor's Anti-Tuberculosis Fund and the King George Thanksgiving (Anti-Tuberculosis) Fund, made a statement on the financial position.

THE CONFERENCE OF THE INTERNATIONAL UNION AGAINST TUBERCULOSIS, 1939

THE XIth Conference will be held at Berlin from 16th to 20th September, 1939. 'Leading specialists who have concerned themselves with tuberculosis both from scientific and social view point will take the opportunity to lecture on the results of their researches and experiences, and contribute thereby to the collaboration which in the end serves the indispensable understanding of the nations'. The Reichs-Tuberculose-Ausschuss, Berlin, is organizing the Conference and Dr. Otto Walter has been elected the President, Dr. Heinrich Grass the General Secretary and Heinz Slangen the manager of the Board. The reigning President of the Union is Prof. Lopo De Carvalho, and Prof. Fernand Benzacon, the General Secretary.

The Conference will discuss the following subjects:—

Biological subject—The problem of the virulence of the tubercle bacillus.

Clinical subject—The value of systematic examinations for the detection of tuberculosis in subjects over 15 years of age.

Social subject—The rehabilitation of the tuberculous.

MEDICAL POST-GRADUATE COURSE IN TUBERCULOSIS

THE Tuberculosis Association of India with the help of the Surgeon-General, Madras, is holding a medical post-graduate course in tuberculosis from the 2nd to the 31st October, 1939, both dates inclusive. The training from the 2nd to the 14th October will be imparted at the Medical College, Madras, and allied tuberculosis institutions there, and for the period 16th to the 31st October at the Union Mission Tuberculosis Sanatorium, Arogyavaram, near Madanapalle. The medical commissioner of the Tuberculosis Association of India and other tuberculosis specialists will deliver lectures on various aspects of the subject, in addition to practical demonstrations, etc.

[The applications for this class had to be submitted before 1st September, and the 25 vacancies will now have been filled.]

THE RED CROSS

HIS MAJESTY THE KING-EMPEROR has been graciously pleased to sanction the following promotions in, and appointments to, the Venerable Order of the Hospital of St. John of Jerusalem:—

As Officers

Lieutenant-Colonel Edward Slade Goss, M.C.
Lieutenant-Colonel Ronald Robert Candy, C.I.E.
Lieutenant-Colonel Norman Briggs.

As Associated Officer

Lieutenant-Colonel Ambuj Nath Bose, O.B.E.

As Associate Serving Brother

Major Dharendra Nath Gupta.

Current Topics

Anti-tuberculosis Work in the Dutch East Indies

By DR. O. WISSE

(Abstracted from the *Bulletin de l'Union Internationale Contre la Tuberculose*, Vol. 16, January 1939, p. 78)

THE campaign against tuberculosis in the Dutch East Indies is of recent origin. Owing to the improved methods of diagnosis the disease is more easily identified and contrary to the general belief the disease, especially pulmonary tuberculosis, has been found to be widespread among the Javanese, the Chinese and the poorer classes of Eurasians. Soldiers, civil servants, peasants, merchants, domestics and numerous women contract the disease. In spite of more interest taken in the campaign against this social scourge, all the work accomplished in the dispensaries and the sanatoria has produced no effect on the course of the disease in the East Indies. This gloomy result is due to the utterly indifferent attitude of the natives towards the disease, their mistrust of western methods of treatment, and hence the lack of co-operation on their part and the inability to adopt the more modern methods of tuberculosis schemes, owing to the low financial condition of the millions of infected natives. In consideration of this last condition the author suggests that more attention should be paid to those anti-tuberculosis measures that cost little. The number of sanatoria should be limited and greatest attention

should be paid to dispensaries which are in closer contact with the population where inexpensive ambulant treatment should be carried out, and to special tuberculosis hospitals which are indispensable for the effective working of the dispensaries for the purpose of observation, control, and survey. Rest cure can be followed at home under the supervision of the dispensary. The author recommends auxiliary methods, such as public-health propaganda, the improvement of popular diet and the increase of national prosperity. The institute for the improvement of popular diet is doing excellent pioneer work in this line. Regarding treatment, the author recommends that native patients need not be transferred to high altitudes as the climate of Java is not unfavourable for the tuberculous. He emphasizes the necessity of submitting a large number of patients to collapse therapy, but at the same time remarks that in Java the number of phthisiologists is not adequate to supervise such treatment.

S. R. G.

The Work of a Tuberculosis Unit in East Africa

By H. N. DAVIS

(Abstracted from the *Tubercle*, Vol. XX, November 1938, p. 76)

THE work was started in 1927 in the district of 'Moshi' in the Northern province of Tanganyika with

an experimental sanatorium containing 25 beds without any facilities for x-ray, or A-P treatment. Visits were made to each village and tuberculosis cases were brought to the sanatorium. Later on, the number of beds was increased to 35 and tuberculosis dispensaries were established (whose number became 10 in 1932). Tuberculin was used both for diagnosis and treatment. Tuberculin treatment was found definitely harmful in marked tuberculin reactors.

Arrangements for x-ray and collapse therapy were made in 1932 and marked improvement resulted in acute exudative cases which hitherto had received medical treatment only. The hospital became more popular and the number of beds had to be increased to 60. Gradually, other operative measures for collapse therapy were introduced.

In the following period of 5 years collapse therapy was given to 261 patients—84 per cent received A-P therapy only and 16 per cent purely operative treatment.

Of the 261 cases, 23 could not be traced and the results of treatment of the remaining 238 at the end of 5 years may be summarized as follows:—

Minimal 51 cases—8 per cent died and 92 per cent alive of which 83 per cent had working capacity.

Advanced 187 cases—49 per cent died and 51 per cent alive of which 58 per cent had working capacity.

Total 238 cases—40 per cent died and 60 per cent alive of which 67 per cent had working capacity.

A comparison of results between collapse therapy and medical treatment alone in advanced cases showed that the mortality rate is about three times higher in the latter group. As regards after-care supervision, a village settlement was started in which families are living and carrying on normal agricultural pursuits in healthy surroundings under medical supervision.

P. K. C.

Tuberculosis in Cyprus

By N. D. BARDSWELL

[Abstracted from the (i) Review of an Interim Report. *British Journal of Tuberculosis*, Vol. XXXIII, 1939, p. 68, and (ii) Final Report. *Tubercle*, 1938-39, Vol. XX, pp. 97 and 165]

To make a survey of the tuberculosis problem in Cyprus, the author made a tour throughout the six administrative districts of the island in 1936-37 collecting all available data and he published an interim report on the incidence and means of control of tuberculosis in Cyprus. This preliminary enquiry was undertaken under these lines: (1) conversation with representatives of all sections of the community; (2) attempts to discover the present condition of all tuberculous cases known to the medical authorities; and (3) tuberculin testing (by the percutaneous method of Moro) of samples of the child population. Certain provisional conclusions were made, the most important of which was that the tuberculosis problem in Cyprus is not so widespread and grave as had been anticipated by the people and government, the tuberculosis mortality being estimated at about 2 per 1,000, and the incidence of positive tuberculin reaction being about 6.5 per cent in village children and 8.2 per cent in town children.

To confirm these conclusions a second visit was made in 1937-38. This investigation was made with two objectives in view: (1) An intensive study of tuberculosis in one of the six administrative districts—the Larnaca district—to determine the incidence and mortality rates, the distribution and character of the disease and the factors favouring its spread; (2) the establishment and organization of a tuberculosis dispensary in Larnaca to serve the town and its associated 58 districts in order to bring under observation all cases of tuberculosis in the district and all available members of households exposed to infection in the past or at the present time. The dispensary was made the centre from which all investigations were carried

out. The inquiry was made under the following different lines:—

(1) The tuberculin testing and examination of the whole school population of towns and villages.

(2) An inquiry into and examination, if alive, of all cases of tuberculosis since 1931, whether notified or not and a study of their environmental and economic conditions.

(3) The systematic tuberculin testing and examination of as many contacts as possible, whether alive or dead. An x-ray was included in the examination when practicable.

(4) Testing and examination on similar lines of contacts of children who gave positive reactions during the school survey.

(5) The systematic study of the death registers of the towns and villages since 1931, to determine the probable annual mortality from tuberculosis.

(6) Attempt to investigate the home conditions according to a home investigation form which contains enough materials for study, of the sociological aspect of tuberculosis.

The chief conclusions drawn from this intensive survey of a selected limited area of this island are as follows:—

(1) The incidence and mortality from tuberculosis, pulmonary and non-pulmonary, in the district is low and is rather less than expected after the preliminary survey. It is estimated that there are about three cases of pulmonary tuberculosis per 1,000 living and the average annual death rate is 0.9 per 1,000.

(2) In its distribution, tuberculosis is sporadic and to a large extent familial, cases being usually traceable to intimate contact with another case in the family with positive sputum.

(3) There is no bovine tuberculosis and the virulence of tubercle bacilli from patients in Cyprus is similar to that of bacilli from patients in Britain.

(4) Infection in childhood is an important factor in the spread of the disease, as a high percentage of child contacts who react positively shows radiological evidence of intra-thoracic tuberculosis.

(5) The Cypriot has a high resistance to tuberculosis, succumbing only to long-continued and massive infection. The Greek-speaking races are somewhat more resistant than the Turk. Chronicity with slight constitutional disturbance is the outstanding clinical picture of the disease. Bronchiectasis appears to be common and is often mistaken for tuberculosis. Acute pulmonary tuberculosis is rare. These characteristics are probably due to some degree of inherited resistance to tuberculosis and to the local conditions, such as climate and the habits of the people (open-air life).

(6) The standard of living and social development of the people is low. Poverty is almost universal. There is no correlation between poverty *per se*, and the incidence of tuberculosis. The nutrition of the people appears to be adequate and normally malnutrition is not an important epidemiological factor. Tuberculosis is often introduced into a family or village from the town or abroad.

The experience gained in the other districts during the preliminary survey suggests that a survey of the other five districts on similar lines would give parallel results.

(7) Tuberculosis in Cyprus, though low in incidence and benign in type, is difficult to control owing to its uniformly scattered distribution, lack of transport facilities, ignorance of the people, the unsatisfactory housing conditions (mostly single-roomed houses) and lack of experienced medical and nursing personnel.

The author suggested that the most effective tuberculosis administration would be dispensaries in various parts of the island under the direction of a whole-time tuberculosis officer and a staff of trained home visitors as nurses, some beds for advanced cases, a small sanatorium unit for the more favourable cases and organizations for the relief and care of tuberculous households.

S. R. G.

Prevention and Treatment of Tuberculosis in Lancashire, England

By G. LISSANT COX

(Abstracted from the *Bulletin de l'Union Internationale Contre la Tuberculose*, Vol. XIV, January 1939, p. 50)

THE tuberculosis scheme of the Lancashire County Council was initiated under the National Insurance Act of 1911 and controlled by the county tuberculosis department, inaugurated in 1914. The scheme covers an area of 1,038,130 acres containing a population of 1,859,200.

For dispensary purposes the administrative county is divided into five large areas each with a consultant tuberculosis officer, a small sanatorium-hospital containing up to 56 beds, three small areas each with a tuberculosis officer and a bigger institution (containing up to 226 beds). Each of the eight areas is operated as a unit by a team of whole-time doctors. A special feature of fundamental importance in the scheme is that the dispensary work is combined with the hospital or sanatorium work.

A staff of 33 whole-time tuberculosis health visitors, who are trained nurses and who have certificates of sanitation or health visiting, are responsible for home visiting and for assisting dispensary work in connection with diagnosis, supervision, x-ray examination, and special treatment. These health visitors are to work in close co-operation with the local health department and social service organizations. They are specially trained to write out a report on the environmental conditions of every new case.

Adequate clerical assistance has always been provided in each dispensary.

A high grade of co-operation between the tuberculosis officers and the general practitioners and medical officers of health is maintained and to this co-operation the Lancashire scheme owes much of its success. It is reported that in 1937, 92 per cent of new cases were sent *before notification* to the tuberculosis officers for an opinion as to diagnosis and treatment.

Special endeavour is made to isolate infective cases in a separate bedroom or at least a separate bed by providing bedsteads and mattresses on loan from the dispensary to poor patients, or by assisting them from care funds to purchase the necessary bed clothes. By this means, at the end of 1937, 97.9 per cent adult infectious pulmonary tuberculosis cases had a separate bed. Moreover, under the Housing Act of 1935, the local authorities are to re-house families who are reported by the dispensary staff to occupy over-crowded houses. Thus, every effort is made to improve the housing conditions of the patients.

Regarding institutional treatment, no charge is made by the Lancashire County Council to patients undergoing the treatment. Accommodation is provided for all types of tuberculosis case and there are also facilities for patients to enter village settlements for treatment and occupational training. For pulmonary cases there are 705 beds representing one bed for every 2,637 of the population or 82 beds per 100 deaths from pulmonary tuberculosis. For non-pulmonary cases there are 276 beds, i.e., one bed per 6,736 of the population, or 143 beds per 100 deaths from non-pulmonary tuberculosis.

The county council recognizes the place of after-care in their tuberculosis scheme, encourages the formation of care committees (there are 14 voluntary care committees), and gives liberal financial support to these committees.

There is a central office which plays the major part in the administration of the tuberculosis scheme and acts as link between the dispensaries and the institutions.

The cost of the scheme for the year ended 31st March, 1937, was £195,075, i.e., £105 per 1,000 of the population, or £18,614 per 100 deaths from tuberculosis.

Results.—In 23 years from 1914 to 1937 the tuberculosis death rate in the administrative county has declined 52 per cent and the case rate 49 per cent.

The author believes that such success as achieved in Lancashire is the result of the policy of combining prevention with treatment and hence the tuberculosis scheme has been built upon the foundation of—find, isolate, educate and treat the adult positive cases.

S. R. G.

Tuberculosis in Infants

By DOROTHY PRICE

(Abstracted from the *British Medical Journal*, Vol. I, 5th February, 1938, p. 275)

SEVENTY-EIGHT cases of infant tuberculosis were investigated. All the patients were below one year old and were admitted in St. Ultana Hospital, Dublin, during the last four years.

Of these infants 60 (= 77 per cent) died, and only 18 were cured. Amongst those who died 22 developed caseous pneumonia from flaring up of the primary focus. Deaths occurred within two to three months. Seventeen developed meningitis—amongst these only 14 showed the presence of a primary focus in the lungs. Two developed abdominal tuberculosis—in one of them only the presence of lung tuberculosis could be detected. One had a primary focus in the liver and may be accepted as a case of congenital tuberculosis.

In the cured group of 18, lung lesions were most predominant though the disease was not so widespread. The diagnosis was made from the history of contact, positive tuberculin reaction and x-ray picture. Generally the tuberculin tests were made by rubbing in Hamburger ointment. When this method proved negative Mantoux tests were done with 0.1 c.cm. of 1 in 100 solution. Tuberculin test showed positive reaction after about six weeks from the first infection.

The most dangerous forms of tuberculosis in these infants were miliary and meningeal. The treatment consisted in quick separation from the source of infection, generally the mother, complete rest in bed until all signs of toxæmia had vanished and x-ray picture showed healing changes, diet rich in calcium and vitamins. It took 6 months to two years for healing, and the sedimentation test gave good indication as to the progress or regress of the disease. All kinds of stimulation, such as exposure to sun's rays, movement, etc., must be avoided.

Healing took place mostly by fibrosis and not by calcification. When the healing was complete even the fibrous tissue could not be well seen in the x-ray pictures.

P. K. S.

Primary Tuberculosis of the Lungs in Children

By A. MARGARET C. MACPHERSON

(Abstracted from the *British Journal of Tuberculosis*, Vol. XXXIII, April 1939, p. 79)

WITH the purpose of describing the course of primary tuberculous infection of the lungs in children, the author made a study of 850 tuberculous children under observation for eight years at a children's contact investigation department at the Brompton Hospital. The diagnosis of tuberculosis was based on the deposition of calcium in the lung lesion, and/or in the corresponding hilar glands, the positive tuberculin test and the presence of tubercle bacilli in the gastric contents, or material removed through the bronchoscope. None of the children had a positive sputum. The course of the primary lesion was followed by periodic radiological examinations. From a comparison with the work of Blacklock and Burke, the author tried to explain the x-ray appearances in the light of the pathological changes in the lesions. For the purpose of description the primary lesions were grouped as (1) uncomplicated—(a) pulmonary lesion predominating, (b) glandular lesion predominating, and (2) complicated—resulting from (a) hilum lymphadenitis, e.g., pulmonary collapse, bronchogenic spread

of infection and hæmatogenous spread, and (b) from pleural involvement. The glandular enlargement is more extensive in infants and younger children than the corresponding lung lesion. In fact, the extensive glandular involvement usually accompanies a small lesion. Healing in the glands is slower than in the lung focus. From a consideration of clinical and x-ray findings, it has been shown that the primary lesion of the lung in childhood usually takes place without giving rise to any symptoms or signs, and the lesion produced passes from the initial pneumonic stage, through the healing process of resolution and organization or caseation and fibrosis to the final healed or calcified stage, without showing any evidence of its existence, except in the x-ray films. It is the complications occurring during the course of the disease which give rise to signs and symptoms. The process of healing usually occupies more than one year and during this time the focus is always a potential source of dissemination of the disease. The gross hilar adenitis is still more important in this respect as this condition may give rise to acute miliary tuberculosis. To increase the rate of the healing process improved nourishment and increased sunlight have been suggested. The ultimate fate of the calcified focus and its relationship to tuberculous lesions developing in adult life are unknown. Follow up of families of tuberculous patients throughout childhood and adolescence to early adult life may throw more light on these problems.

S. R. G.

The Social Aspects of Tuberculosis

By KARL TISCHEL

(Abstracted from the *Bulletin de l'Union Internationale Contre la Tuberculose*, Vol. XVI, January 1939, p. 6)

TUBERCULOSIS is called a social disease because it is more prevalent with adverse living conditions, occurs frequently during the most productive years of life, and has a tendency to lower rapidly the economic level of the patient and his family. For obvious reasons, tuberculosis is not only a medical but also an economic problem of the greatest magnitude. Since Koch's discovery of the tubercle bacillus, it has been shown that in tuberculosis both the soil and the seed are equally important. The incidence of tuberculosis depends on both environment and exposure. As to the influence of environment, the author quoted the fact that during the three decades since 1900 the living conditions in the United States had been extremely favourable, and, coincident with this remarkable improvement in general health, there had taken place a sharp and accelerated decline in the tuberculosis death rate from 202 in 1900 to 76 in 1929 per 100,000 of the population. During the following eight depression years, in spite of the same active anti-tuberculosis campaign, the same care, and the same clinics and hospital facilities for the tuberculous and their contacts, there had been a small but significant rise in the death rate. Thus, the pendulum of tuberculosis mortality swings with the change in the environment in spite of effective measures of prevention. This conclusion has been amply justified by observations made all over the world during and after the War between 1914 and 1922. The gradual and remarkable decline in tuberculosis death rate in European countries since 1885 was suddenly set back and actually turned the other way by the changed environments of war and its after effects, the loss in the best stock of the population and the survival of the unfit and the weak, the sudden increase in industrialization, the lack of food and other necessities of life, the shortage of housing accommodation, the increased hardship and over-work, the increasing unemployment and economic depression. Environment is, therefore, the determining epidemiological factor in tuberculosis, whereas the prevention of infection, though necessary and desirable, plays a secondary part.

To emphasize the overwhelming importance of environment in tuberculosis the author made a comparison between war and depression. There is an essential difference in the action of forces at play in both situations. During war a great number of adverse circumstances results in a marked increase in the deaths from tuberculosis. During depression there is lack of nutrition, but at the same time, because of the drop in demand and limited production in many industries, there is great reduction in working hours. Therefore, during depression as far as tuberculosis is concerned, the deleterious effect of deficient nutrition is counter-balanced by the protective influence of compulsory rest and avoidance of fatigue. The cycles of depression are again invariably followed by periods of prosperity accompanied by booms in good health.

The term depression is freely applied to cycles of lessened business activity and the diagnosis of the term is made from a variety of symptoms according to the view-point of the observer. But for a social worker the vital statistics are the barometer whose readings only are dependable. The author then quoted exhaustive data from various health surveys and bulletins to show the well-being and health of the American people. In 1937, the bad effects of poor nutrition, inadequate housing and the sense of insecurity were more serious and more widespread in America than in 1932. The diets of low-income families are sadly deficient in milk and other nutritional substances and their energy values are much below the minimum caloric requirements. The incidence of disability due to illness and the annual loss of working days is highest in low-income and relief families. Tuberculosis (all forms) now ranks seventh among the leading causes of death in that country and occupies the eighth place in the chart of disabling chronic illness. It is concluded from all data that the vitality of the American people is impaired, particularly in the low-income classes. People are part of the nation's resources only if they are physically fit, they become a liability when they are incapacitated by illness and want of nourishment. Hence, it is the duty of every government to safeguard all resources of the nation against wastage, including the health of the population. The improvement in housing conditions, the powerful environmental factor in the maintenance of health and prevention of tuberculosis, is to be welcomed. Housing standards in the United States are much lower than in other industrialized countries, such as Great Britain and Germany. The author welcomes the new Federal Housing Programme and recommends that any improvement in this direction must be accompanied by a reduction in rent, the crucial point in the vexing housing problem. The slum clearance by 'model' house building has not been entirely successful elsewhere, as the increased rents in the new buildings tell upon the tenants' already minimal allowances for food, and the resultant nutritional impairment weakens their defences against disease and death. Slums should disappear from any civilized country, but no health scheme can be fully successful unless a minimum existence besides decent housing is provided for all.

The physical fitness of the population depends to a great extent on economic conditions and the impairment of health causes losses to the wealth of the nation. This is particularly true with regard to such a disabling disease as tuberculosis, the prevention of which is not merely a public health problem but also a powerful social and economic one. The measures of control of tuberculosis which had been successful under normal conditions, and which may even forecast further promises in the future, will be proved inadequate under abnormal economic conditions. The eradication of this disease with so many ramifications can only be dreamed of with economic equality which may never come true. So all efforts of control should be reinforced and funds must be found to continue organized anti-tuberculosis work without any letting up. It would be a short-sighted policy to curtail preventive health measures for the sake of economy. Tuberculosis is intimately bound up with universal economic factors. The tuberculosis problem with its wide ramifications

is closely linked up with and cannot be separated from other momentous issues of the day. No definite prophecy as to the future of tuberculosis can be made at the present moment of world-wide turmoil and

unrest. The final conquest of tuberculosis, therefore, depends on the restoration of normal conditions and the survival of civilization.

S. R. G.

Reviews

PULMONARY TUBERCULOSIS: PATHOLOGY, DIAGNOSIS, MANAGEMENT AND PREVENTION.—By G. G. Kayne, M.D., M.R.C.P., D.P.H., W. Pagol, M.D., and L. O'Shaughnessy, M.D., F.R.C.S. 1939. Oxford University Press, London and New York. Pp. xvi plus 565. Illustrated. Price, 42s. Obtainable from Oxford University Press, Bombay and Calcutta

The number of the medical books that are published each year is terrifying; even books in a limited field, such as tuberculosis, must run into three figures each year (Lewis's catalogue includes only about two hundred books on this subject, but they have been carefully selected). In these circumstances, one would scarcely expect to find a 'long-felt want'; yet this book does seem to have shown that a 'want' did actually exist.

It is a book written by a physician, who also has a sanitarian's outlook, a pathologist, and a surgeon: each has been responsible for certain sections of the book, but, as each writer has revised the sections of the other two, there are no sharp lines of demarcation and the book forms a homogeneous whole.

It is generally acknowledged that one of the best ways to acquire a sound knowledge on any subject is to write a book about it; a better way is perhaps to collaborate in writing a book, for the writing of this book must have been a liberal education to each of its three authors. By the time the various sections of this book reached their final draft this education had been completed, to the great advantage of the book and its readers.

The first section, nearly a third of the book, is on pathology. In no other disease is a thorough knowledge of the pathology more necessary to a proper understanding of its clinical aspects. This section includes discussions on the organism itself, the tissue response to infection, allergy, immunity, and natural resistance, and the evolution of the disease in man. We do not know of any other book in which this difficult subject has been so clearly treated.

The next part is on diagnosis, history taking, symptoms, signs, bacteriological investigations, radiological examination, tuberculin testing, and serology and hæmatology. Radiological examination is given 44 pages out of a total of 548; this comparatively small proportion should be noted, as some phthisiologists attach undue importance to a skiagram, and many radiologists appear to consider that the sciences of radiology and phthisiology are identical. Here radiology is put in its right place, which is of course a very important one, but its limitations are defined. In the summary of this section one is a little alarmed to read that 'a complete radiological examination of the chest of a patient may include all of the following: screening in various positions; postero-anterior photographs of various densities in the erect and supine positions and in vertical shift; lateral and oblique photographs and photographs in the lordotic position; double exposure with a Potter-Bucky grid; tomography; bronchography; and kymography'. But we entirely agree that 'single photographs cannot be relied upon in deciding whether a tuberculous lesion is active'.

In the chapter on bacteriology emphasis is laid on the value of bacteriological examination of the gastric contents, even in adults; it has for some time been recognized as the best method of confirming a diagnosis in children.

The Mantoux test is naturally given preference to other tuberculin tests, and the use of P.P.D. is strongly advocated.

Part III is a comparatively short one, on prognosis.

Part IV is on the management of pulmonary tuberculosis, on the principles of treatment, criteria of progress, the completion of treatment, and modes of treatment. The modern tendency is again well reflected in the apportionment of space; out of 161 pages on the modes of treatment, 144 are devoted to collapse therapy. The surgical procedures of the various methods are described in detail. There is an appendix to this part in which the course of the disease and the different treatments given in 20 cases are shown on charts.

The last part is a short but very important one on epidemiology and prevention.

This is a book that should be very widely read in India where tuberculosis is now being tackled seriously. We know of no other book that covers the whole subject so completely. It is an excellent book and one that we can very strongly recommend to the sanitarian, the practitioner, the tuberculosis specialist and also to the surgeon.

TROPICAL MEDICINE.—By Sir Leonard Rogers, K.C.S.I., C.I.E., LL.D., M.D., B.S., F.R.C.P., F.R.C.S., F.R.S., and Sir John W. D. Megaw, K.C.I.E., B.A., M.B. (Hon.), D.Sc. (Queen's University). Third Edition. 1939. J. and A. Churchill, Limited, London. Pp. xli plus 544, with 2 coloured plates and 87 text-figures. Price, 16s.

It was once said that one only had to settle in a tropical country with a microscope and a bottle of Leishman's stain to make a startling discovery each day. That time has passed; the centre of focus in tropical medicine is no longer on parasitology; it is daily moving towards biochemistry. This excellent practical book on tropical medicine to some extent owes its origin to a desire on the part of its authors to protest against the purely parasitological outlook that was the rule during the first post-war decade, and to keep the attention of the student and physician closer to the bedside from whence he can view the relative importance of the various auxiliary sciences without prejudice.

The general trend of opinion during the last ten years has fully justified this point of view, or, as these two authors can undoubtedly be considered leaders of thought in tropical medicine, perhaps one should say, their teaching has borne fruit.

The rapid exhaustion of the second edition has given the writers of this book an opportunity to revise it and bring it up to date. One associates with the word 'tropical' a rapid growth and this is one of the outstanding characteristics of tropical medicine, so that in a period of four years much will happen and considerable revision will be necessary after such an interval. This revision has been carried out in every section and some of the chapters have been almost completely rewritten.

The temptation to expand the book has been firmly resisted, so that it still remains a 'short' tropical medicine, without showing any traces of being a synopsis, or cram book. We agree with the authors that references would be entirely out of place in a book of this kind; in justification for this attitude they mention that the literature on typhus fevers alone now runs to a thousand references.

The most extensive revision has been carried out in the chapters on typhus, yellow fever, cholera and

dietary diseases. The recent studies on tropical typhus in India have been summarized well. The pioneer work of the writer of this section was largely responsible for focussing attention on this disease, which was not recognized before his day. The new confusing element, jungle yellow fever, which is not transmitted by *aedes* and does not depend on man as a carrier, is reported; as the writer says, this does not change our ideas of the epidemiology and prevention of the *aedes*-borne urban yellow fever, but it does appear to postpone almost indefinitely the day when this disease will be banished from the world.

In the chapter on cholera, which is one of the best in the book, all the recent work on the bacteriology of this disease has been included and a fair appraisal of bacteriophage, prophylactically and as a curative agent, is given. In the section on diet in health and disease, there is a new and up-to-date table showing the principal vitamins, their properties and the diseases associated with their absence from, or deficiency in the diet, and all recent work, such as that on nicotinic acid in pellagra, is incorporated.

There is no increase in the size of the volume but the publishers have very cleverly increased the amount of printed matter on each page, without altering the type or decreasing the readability. From an æsthetic point of view it is still a pleasant page with a sufficiently wide margin.

This third edition can scarcely fail to enhance the already established popularity of this book.

L. E. N.

MODERN TREATMENT IN GENERAL PRACTICE: YEAR BOOK 1939—A YEAR BOOK OF DIAGNOSIS AND TREATMENT FOR THE GENERAL PRACTITIONER.—Edited by C. P. G. Wakeley, D.Sc., F.R.C.S., F.R.S.E., F.A.C.S., F.R.A.C.S. (Hon.). Butterworth and Company (India), Limited (Incorporated in India), Calcutta and Bombay. Pp. xii plus 365. Illustrated. Price, Rs. 7

Six years ago, the *Medical Press and Circular* started a series of articles on modern treatment in general practice, and at the end of the year they published these in book form. The next year these useful articles were continued and again issued in book form, as *Modern Treatment in General Practice*, Vol. II. In 1937, volume III appeared. In 1938 there was a slight change in the title, the volume number was dropped and the year substituted, so that the volume appeared as *Modern Treatment in General Practice*, 1938. This year there is a further modification of the title and the series of articles that were published in our invaluable contemporary during 1938 are reprinted in book form as the *Modern Treatment Year Book*. Thus another 'annual' has been born.

In this volume there are 36 articles on modern treatment by well-known British physicians and surgeons; these include Sir Humphry Rolleston, Sir Walter Langdon-Brown, Dr. Letheby Tidy, Mr. Cecil Wakeley, and Mr. Alec Bourn. There are also a dozen articles from that useful series 'Pitfalls in Diagnosis'.

There are two articles in the series which will be more useful to readers in this country than to those in Great Britain, namely, on malaria and blackwater fever, respectively. Dr. Murgatroyd has given a good account of the treatment of malaria in different circumstances. The same writer contributed the chapter on blackwater fever which is a sound and practical guide to the treatment of this dangerous disease; he is guarded in his recommendation of blood transfusion and suggests that it may be resorted to as a life-saving measure in cases of extreme anaemia. Two points to be remembered are that in no disease is blood regeneration more rapid than in blackwater fever and that once the organism has adjusted itself, and this must be a matter of hours at the most, a patient can carry on with 10 per cent of his normal allowance

of hæmoglobin, so that, unless it can be claimed that blood transfusion decreases the danger of further hæmolysis, which seems unlikely, there is, in the reviewer's opinion, little room for it in the treatment of this disease.

The main point about this series is that no attempt is made to cover the whole range of medical and surgical treatment each year, but as far as possible new subjects are chosen, so that, if one adds a volume every year, the whole collection will form a kind of encyclopædia of treatment which any practitioner will find very valuable for reference.

A SYNOPSIS OF HYGIENE.—By Sir W. Wilson Jameson, M.A., M.D. (Aberd.), F.R.C.P., D.P.H., of the Middle Temple, Barrister-at-Law, and G. S. Parkinson, D.S.O., M.R.C.S., L.R.C.P., D.P.H., Lieut.-Col., R.A.M.C. (Retd.). With a section on Personal Hygiene by G. P. Crowden, D.Sc., M.R.C.S., M.R.C.P. Sixth Edition. 1939. J. and A. Churchill, Limited, London. Pp. viii plus 687, with 16 illustrations. Price, 21s.

This book has almost become a 'classic', although its original authors have revised the present edition; it is therefore scarcely necessary to do more than announce that a new and completely up-to-date edition has been published.

'Hygiene' is a wide field and a single volume on the subject must necessarily be a synopsis. In this book, however, the subject is presented in very readable form, and is not simply a series of tabulated statements. It is a book that will be invaluable to the D.P.H. student, as well as to the undergraduate student who is taking a degree for which some general knowledge of hygiene is essential. The book will also prove very useful to any practitioner, as there are many matters connected with even personal hygiene which he will find dealt with far more clearly and completely than in any book on general medicine.

Admittedly, the book is written primarily for the student and practitioner in Great Britain, but all the principles and most of the details are applicable to conditions in India.

For many years the student in this country will have to rely on 'foreign' teaching on this subject, not because good books cannot be, and have not been, written, but because the data on which the teaching is based are not yet available in this sanitariously-backward country.

It is a book we can strongly recommend to the student and teacher in India.

ESSENTIALS OF FEVERS.—By G. E. Breen, M.D., Ch.B. (N. U. I. Dub.), D.P.H., D.O.M.S. (R.C.P. Lond., R.C.S.Eng.). 1939. E. and S. Livingstone, Edinburgh. Pp. xii plus 274. Illustrated. Price, 7s. 6d. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 5

In this small volume the author has dealt with the 'essentials' of these acute infectious diseases commonly known as 'fevers'. Cases of fever form a large proportion of the patients that a general practitioner has to attend to in his day-to-day practice and the importance of a practical knowledge of the subject of fevers can hardly be over-emphasized.

The author has described the general features, the sources, the results of, and spread and control of, the infections in the first three chapters. These chapters contain a vast amount of information. The section on examination of the fever cases and the general measures of treatment contains practical details that will be found useful by students and practitioners alike. The different diseases have been dealt with satisfactorily and there are no omissions of vital facts.

The book will prove useful to medical students and young practitioners.

P. C. S. G.

YAKSHMA O TAHAR PRATIKAR—(TUBERCULOSIS AND ITS TREATMENT)—IN BENGALI.—By Dr. Bidhu Bhusan Pal, Teacher of Dacca Medical School (Retd.). First Edition. B. S. 1346. Published by Purnendu Bhusan Pal, 39/5/1A, Gopal Nagar Road, Allpore P. O., Calcutta. Pp. 96. Price, Re. 1. Available from Messrs. M. C. Sarkar and Sons, Limited, Collogeo Squaro, Calcutta

IN view of the fact that about a hundred thousand people die of tuberculosis every year in Bengal, and many more are incapacitated by it, any attempt at mass education in the various manifestations of the disease and its prevention is certainly praiseworthy. Not many books have appeared in Bengali on the subject, so there is room for many more.

Most of the essential facts about tuberculosis have been condensed in ninety-six pages in simple Bengali which even a schoolboy should have no difficulty in understanding.

The book is admirably suited not only for the laity but also for the Bengali village practitioner.

A. K. M.

CANCER: CAUSATION, PREVENTION AND TREATMENT.—By A. E. Blackburn, M.D. 1939. H. K. Lewis and Company, Limited, London. Pp. viii plus 111 with 14 illustrations. Price, 6s.

THIS book is an enthusiastic presentation of the author's theory that cancer is caused by excessive ingestion of animal fats. He accepts Warburg's dictum 'If the respiration of a growing cell is disturbed as a rule the cell dies. If it does not die a tumour cell results' and the observation made by Watermann regarding the effect of diet on mice developing tar cancer. The latter investigator found that sugar had a slightly unfavourable effect, that protein amino-acids had no action, and that animal fats had a very unfavourable influence.

Dr. Blackburn observes that the possession of an excess of carbon atoms is an essential feature of all proved carcinogenic substances—soot, paraffin, tar, dibenzanthracene, œstrone, testosterone, etc. He includes in this series animal fats of high molecular weight, like the fat of the ox, the sheep and the goat. He states that the free carbon atom arrests the oxidation of the cell and a state of continued sub-oxidation results in malignancy. Externally the free carbon atom impinges on the body as soot, tar, tobacco fumes, etc., and internally as ingested animal fat of high molecular weight. The rôle of fat native to the human body when forced by pressure or injury into ducts and acini, in producing carcinoma of the breast or of the fat of the smegma preputii in producing cancer of the penis and cervix and the applications of this theory of suboxidation to genesis of cancer in other organs of the body, can be appreciated best only by reading this stimulating book.

Arguments in favour of the theory based on a study of the diets of primitive and civilized races and even on historical injunctions of the Old Testament have been clearly and cogently presented. Modern civilization as affecting the problems of diet, dress and parenthood is criticized by Dr. Blackburn at different places in the book.

The age of circumcision amongst Muslims is stated by the author to be about 14 years. This rite is performed by the millions of Muslims inhabiting India before the age of 5, and frequently soon after birth.

The higher incidence of cancer amongst Hindu women as compared with Muslim, in India, is ascribed by Nath and Grewal to the custom of early marriage amongst the Hindus and the trauma of frequent confinements under unhygienic conditions leading to chronic cervical sepsis. Dr. Blackburn quotes the same data in support of conjugal origin of cancer of cervix uteri suggesting a carcinogenic rôle to the fatty preputial secretion.

The subject-matter of the book is well arranged and well presented. The expression of views in places is

a little too emphatic, but the advancement of a new theory always demands a certain amount of dogmatism.

V. N.

AIDS TO DERMATOLOGY AND VENEREAL DISEASE.—By R. M. B. Maokonna, M.A., M.D., B.Ch. (Camb.), M.R.C.P. (Lond.). Second Edition. 1939. Baillière, Tindall and Cox, London. Pp. vii plus 284. Illustrated. Price, 4s. 6d.

THIS is a summary of diseases of the skin and venereal diseases which, like the other volumes of this series by the same publishing house, can be classed as a useful book for rapid revision of the subject by students just before an examination to remind them of the main points, but in the reviewer's opinion it should not be used for any other purpose as it does not take the place of a larger book. One criticism we have to offer is the inclusion of yaws among the venereal diseases, and the reasons given by the author for this unusual step are not convincing.

GENETICS AND THE CLINICIAN.—By Lindsay Ride, M.A., M.B., Ch.B. (Oxon.), M.R.C.S. (Eng.), L.R.C.P. (Lond.). 1938. John Wright and Sons Limited, Bristol. Pp. xiii plus 146. Illustrated. Price, 10s. 6d.

THERE is a need for a book like this amongst medical men. An attempt has been made to present the old and the new order of things in heredity in a readable form. The preservation of the ancient usage for describing contrasting characters, unfortunately, is still in the way. If the capital T represents the dominant character tall, why should the small t represent the recessive character dwarf? Small d is the appropriate symbol. The capital W is utterly unsuited to represent the dominant red eye of the female fruit-fly (*Drosophila melanogaster*) for the purpose of teaching genetics to the clinician who is essentially a busy man. Decoding and following the new combinations at the same time is irksome, to say the least. Even eminent biologists of a bygone generation like the late Professor J. A. Thomson agreed to discard the usage in the interest of lucidity.

The stages in the splitting of the chromosomes have been kept well under control, considering that some recent workers in cytology claim to see more than two strings of genes in a chromosome always. Chromosomal basis of the naturally and perpetually occurring variation in living things is explained in a nutshell. Cytoplasmic inheritance is not lost sight of.

Introduction to genetical ratios in human data is excellent. Anthropological physiology is thought stimulating. Inheritance of serological characters is very well treated; lawyers with a biological inclination will find it useful in dealing with evidence on blood groups.

The binding, the paper and the printing are good. The size of the page could perhaps have been smaller. The price is not unreasonable.

S. D. S. G.

GYNÆCOLOGY.—By Herbert H. Schlink, M.B., Ch.M. (Sydney), F.R.A.C.S. 1939. Angus and Robertson Limited, Sydney and London. Pp. xv plus 557. Illustrated. Price, 32s. 6d.

A TEXTBOOK written primarily for students should possess certain features—clearness of expression, interest, good print and illustrations, compactness without sacrificing essentials, and cheapness.

Mr. H. H. Schlink has written a book which has these characteristics with the exception of the last. (The price is high for a student's pocket.)

The author writes with the obvious sincerity and conviction of much experience, and with the desire to give sound instruction to students.

One or two points of his advice might not coincide with the teaching in other schools, in respect to endocrine therapy, the choice of operation for retroversion, and the 'purgation' treatment of peritonitic ileus.

The pathology of some of the ovarian cysts is a little confusing. The terms 'blood cysts', 'tarry cysts' and 'chocolate cysts' are not happy, especially as in one place 'Chocolate cysts' are included under the heading 'tarry cysts' whilst in another they appear under endometriomata, each in the classified list of tumours being made a separate entity. The reader is a little bewildered in this section of the book.

These points are raised with no intention of detracting from the general excellence of the book. Special interest is aroused by the chapter on malignancy, and the photomicrographs are especially helpful and clear. Chapters on examination of the patient, operative gynaecology, and post-operative complications are included.

This book is recommended with confidence to all senior students, and to general practitioners.

K. S. F.

CATALOGUE OF LEWIS'S MEDICAL AND SCIENTIFIC LENDING LIBRARY. PART II. CLASSIFIED INDEX OF SUBJECTS, WITH NAMES OF AUTHORS WHO HAVE WRITTEN UPON THEM. 1939. H. K. Lewis and Company, Limited, London. Pp. 156. Price, Complete 16s. (Subscribers 8s.)

PART I of this useful catalogue was reviewed in the March number. This obvious and necessary corollary has been completed with the same care and thoroughness, and it shows how completely 'Lewis's' covers the whole range of medical subjects.

We mentioned before that the catalogue will form a useful book of reference for any medical library, and for the subscriber to this famous library it will of course be invaluable.

Abstracts from Report

KING EDWARD VII SANATORIUM, BHOWALI, U. P. ANNUAL REPORT FOR 1938

At the request of the committee, the Inspector-General of Civil Hospitals paid a visit to the sanatorium in January to report if it was desirable to keep the institution open during the winter months also. On his recommendation the committee decided that it should remain open throughout the year in future. The result was that patients joined much earlier at the commencement of the year than in the past and the accommodation was occupied for a longer period. The temporary closure of the sanatorium during the winter season not only caused hardship to those patients who wanted to stay during this period but it also affected the continuity of treatment among others who were showing satisfactory response to treatment. His Excellency Sir Maurice Hallett during his visit to the sanatorium on 9th September, 1938, remarked, 'I trust more will remain in future, for I feel sure that many patients would benefit by staying in the healthy surroundings and invigorating atmosphere of Bhowali instead of returning to possible unhealthy residence in the plains'.

Thirty-two patients remained in the sanatorium on 1st January, 1938, from the previous year, and 242 patients were admitted and 203 patients discharged during the year under report. The daily average number of patients treated was 99.40. The largest number of patients was 136, during the months of May and August, and the lowest number on any single day was 29 in the month of January.

The following improvements are worth mentioning:—
Improvements in the 'D' class ward.—The roof has been extended and the verandah closed in by doors and windows, due regard being paid to ventilation. Wooden partitions have been erected up to a certain height dividing the ward into ten cubicles, two patients

occupying each cubicle. This has given a certain amount of privacy. These changes have undoubtedly added to the comforts of the patients of the 'D' class.

A verandah and two rooms have been added to the south side of the recreation hall.

Additions and alterations in the administrative building.—The staff increased during the last two years and office accommodation was required for the newly appointed junior clerk and for the overseer. It was also necessary to shift the ultra-violet-ray lamp from the surgical annexe to the x-ray department, which is the proper place for it.

Post-graduate training.—Two doctors, one of them from Jaipur State, were sent for training for three months.

Since the post-graduate training received in the Bhowali Sanatorium is recognized by the University of Wales for its Tuberculous Diseases Diploma examination, the committee decided to give necessary facilities for training on payment of Rs. 150 as fees for a renewable period of three months and the Superintendent was also authorized to charge Rs. 75 for accommodation for the same period if such accommodation was available in the sanatorium.

Social activities.—The importance of amusement and recreation in the treatment of pulmonary tuberculosis is universally recognized. Anything that can relieve the monotony of long stay in the sanatorium and divert the patients' minds from their disease without detriment to their health is considered as a part of sanatorium treatment. With this object in view a number of social activities and recreative diversions were arranged from time to time.

Library.—A number of books and magazines were presented by the Red Cross Society and other friends for which the sanatorium is very grateful. The library possesses a number of books in Hindi, Urdu, English and Bengali, and they are freely used by the patients.

The sanatorium continued to receive gift copies of the following and is grateful to the editors for them:—

The *Statesman*, *Pioneer*, *Illustrated Weekly of India* and the illustrated weekly edition of the *Leader*.

The *Hindustan Times* and *National Herald* were added as gifts to the above list during the year under report and our thanks are due to the editors of the two dailies.

Horlicks Ltd. continued to supply free copies of the *Sphere*, *Strand* and *Til-bits* and we gratefully appreciate their generous gift.

The sanatorium altogether gets seven dailies, one bi-weekly, three weeklies and eight monthlies for the benefit of the patients.

Donations.—Sir J. P. Srivastava gave a donation for the construction of a block of six rooms for use of the female patients to commemorate the marriage of his first daughter. The cost of the block came to Rs. 5,700 and with the approval of the donor it has been reserved for female patients of the 'C' class.

At the time of his visit to the sanatorium last year, the Honourable Premier was pleased to announce that the Government would give a suitable donation for providing modern amenities to the patients in the newly constructed recreation hall. A non-recurring grant of Rs. 3,000 was sanctioned by the Government for this purpose.

Mr. Shiv Nath Singh gave a donation of Rs. 300 to commemorate the memory of his late wife who was a patient in the sanatorium in 1934 and 1935.

Inspection.—The sanatorium was officially inspected by Colonel J. A. S. Phillips, C.I.E., V.H.S., D.P.H., I.M.S., Inspector-General of Civil Hospitals, on 3rd October, 1938. He was pleased to observe that the whole sanatorium was 'spotlessly clean and the patients comfortable and well looked after', and he congratulated Dr. Shrikhande and the Staff on a 'well-run and well-maintained institution'.

The financial condition of the sanatorium remained satisfactory.

The most pressing need at the present moment is electrification.

An Appeal.—The moving appeal issued by Her Excellency the Marchioness of the Linlithgow on

behalf of the King-Emperor's Anti-Tuberculosis Fund in order to combat the growing scourge of tuberculosis in India has aroused considerable interest. Whatever measures are adopted in connection with the fund, there can be no doubt that the King Edward VII Sanatorium at Bhowali which is the only public institution of its kind in the province will continue to serve its useful purpose. I therefore approach the public for giving increasing support to the institution. Public donations apart from those at the time of its establishment have been very rare and any help, in cash or kind, would be gratefully appreciated.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL T. C. BOYN has been appointed Inspector-General of Civil Hospitals, U. P., from 10th June, 1939.

Lieutenant-Colonel A. S. Garewal, on return from leave, is re-posted as Superintendent, Central Jail, Jubbulpore, from 5th July, 1939.

The services of Lieutenant-Colonel B. P. Baliga, Superintendent, Dum Dum Central Jail, are replaced at the disposal of the Government of India, for employment in the Military Department, with effect from the date of expiry of the leave granted to him.

Major B. J. Griffiths has taken over charge as Civil Surgeon, Lucknow, from 14th June, 1939, afternoon.

Major R. A. Wesson, on return from leave, took over charge as Civil Surgeon, Allahabad, on 26th June, 1939.

Major F. R. W. K. Allen, on return from leave, is re-posted as Civil Surgeon and Superintendent, Robertson Medical School, Nagpur, from 3rd July, 1939.

Major S. Annaswami, Superintendent, Midnapore Central Jail, is appointed to act as Superintendent, Dum Dum Central Jail, with effect from the 20th July, 1939, or any subsequent date on which he actually takes over charge, *vice* Lieutenant-Colonel B. P. Baliga, on leave.

Major A. N. Chopra, Officer in charge, Medical Store Depot, Lahore Cantonment, whose services are placed at the disposal of the Government of the Central Provinces and Berar, with effect from the 11th July, 1939, forenoon, is posted to the Central Jail, Jubbulpore, for training with effect from 17th July, 1939.

The services of Major E. A. R. Ardesir, which were transferred by the Government of India, Defence Department (Army Branch), to the Civil Medical Department of the Government of Bengal, with effect from the 26th November, 1938, are hereby placed at the disposal of the Home (Jail) Department of this Government, with effect from the same date.

Captain G. W. Miller has been transferred as Port Health Officer, Bombay.

Captain T. Sommerville is transferred to the Civil Jail, Port Blair, in addition to his own duties, with effect from the 22nd May, 1939.

Captain T. Sommerville is transferred to the Civil Branch of the Indian Medical Service. He is appointed to the Medical Research Department, on probation for 2 years, with effect from the 30th May, 1939 (afternoon), and is attached to the Pasteur Institute of Southern India, Coonoor.

Captain F. C. Leach, Civil Surgeon and Superintendent, Robertson Medical School, Nagpur, is posted as Civil Surgeon, Saugor, from 10th July, 1939.

Captain J. W. D. Goodall, Civil Surgeon, Midnapore, is appointed to act as Superintendent, Midnapore Central Jail, in addition to his own duties, with effect from the date on which Major S. Annaswami proceeds to take charge of the Dum Dum Central Jail.

LEAVE

Lieutenant-Colonel D. Clyde proceeded on 3 months' leave from 15th June, 1939.

Lieutenant-Colonel B. P. Baliga, Superintendent, Dum Dum Central Jail, is allowed leave on average pay for 4 months, with effect from the 20th July, 1939, or from any subsequent date on which he is relieved.

Lieutenant-Colonel C. J. Lodge Patch, M.C., Medical Superintendent, Punjab Mental Hospital, Lahore, proceeded on leave on half-average pay for 2 months and 28 days, with effect from the 21st July, 1939.

PROMOTION

Lieutenant (on probation) to be Captain (on probation)

W. S. Hacon. Dated the 11th July, 1939.

RESIGNATION

Captain K. I. E. Macleod resigns his commission. Dated the 25th March, 1939.

Notes

CARDIAZOL

CARDIAZOL is a circulatory and respiratory stimulant with a central action, and is rapidly and completely soluble in water and lipoids; hence its surprisingly prompt action. It can be administered *per os*, subcutaneously, intramuscularly and intravenously which multiplicity of forms of application gives it decided advantages over camphor and also over strychnine. It acts directly on the nervous centres and increases their excitability. The excitant effect on the vasomotor and respiratory centres is especially important. That on the vasomotor centre results in an increase of the volume of blood in circulation, due, primarily, to constriction of the vessels in the splanchnic region, followed by improvement of blood pressure and cardiac performance. The excitation of the respiratory centre brings about a deepening and slowing of respiration, with an increase in respiratory volume. These beneficial results are further supported by direct dilatation of the bronchi. The favourable influence of cardiazol on expectoration deserves to be stressed. Its main indications are circulatory disturbances (especially vasomotor debility), collapse, respiratory paralysis, infectious diseases, poisoning, as well as bronchial asthma. In surgical practice cardiazol is highly valued as a means to overcome incidents during anaesthesia, and as a rousing agent.

A NEW SYNTHETIC ESTROGENIC SUBSTANCE

The sex hormones, particularly the female hormones, have now taken a definite place in the armamentarium of the modern physician. By their use in the treatment of disorders of the menopause in women it is possible to soften the blow and render the stormy passage comparatively smooth and uneventful. Their value is not confined to climacteric disorders but makes itself evident in ovarian deficiency and disorders connected with the female generative system in general.

Until the present all substances used in practice have been hormones derived from the human and animal body consequent on the discovery of Ascheim and Zondek (1927) of their presence in the urine of pregnancy. While the isolation of pure crystalline substances from natural sources has simplified the question of standardization, the process of manufacture is attended with considerable difficulty and expense.

The various researches which led to the elucidation of the chemical structure of the hormones Estrone and its related compounds stimulated efforts to

synthesize them and these in turn led to the search for simpler substances possessing oestrogenic activity. The progress of simplification from the complex sterol derivatives via the tetrahydronaphthalenes to the dihydro-diphenyl derivatives was rapid (Dodds and his co-workers) and a notable point in the search has been reached in the discovery that the even simpler stilbene derivatives possess an activity surpassing that of the natural products.

The Crookes Laboratories now offer to the medical profession one of the most active of such products yet discovered, 4,4'-dihydroxy α , β -diethyl stilbene under the name of Neo-Estranol I.

GYNÆCOLOGICAL INDICATIONS

Menopause—natural or artificial following surgical procedures. Hypoplasia of the uterus, amenorrhœa, hypomenorrhœa without hypoplasia, oligomenorrhœa, dysmenorrhœa, pruritus and kraurosis vulvæ, menorrhagia, frigidity, delayed puberty. Gynæcological hæmorrhage, sterility and habitual abortion. Senile vaginitis, toxæmias and vomiting of pregnancy.

A RESPIRATORY AND CIRCULATORY STIMULANT

'NICAMIDE' nicotinic acid diethylamide, a powerful respiratory and circulatory stimulant, is prepared by Burroughs Wellcome and Co., Snow Hill Buildings, London, E.C.1, and is available to the medical profession as a 25 per cent solution for oral administration, in bottles of 15 c.cm. and 100 c.cm. and as Hypoloid Nicamide, a 25 per cent solution for intravenous or intramuscular injection in ampoules of 2 c.cm. and 5 c.cm. Following the administration of Nicamide, depth and frequency of respiration are stimulated, and the force of cardiac contraction is increased. The drug causes a rise in blood-pressure probably brought about by reflex stimulation of the vasomotor centre through the carotid sinus. Nicamide acts effectively either by mouth or by injection; the indications for its use include all conditions associated with shock and depressed circulatory and respiratory states.

AN IDEAL STIMULANT IN METABOLIC DISORDERS

THE stimulating properties of Brand's Essence—due to the high degree of solubility of its natural protein—make it invaluable to the medical man in all cases where the minimum energy can be spared for digestive effort. Brand's Essence liberates and strengthens the gastric juices; assimilation is speedy, most of the free acid being absorbed by the soluble protein which leaves no solid precipitate or irritant.

In stomach disorders, childbirth, pneumonia, and all febrile conditions there is no tonic so readily acceptable by the debilitated digestive organs, or more markedly stimulating in its effect. It can be given at a moment's notice with a teaspoon and, as it does not cause thirst or diarrhœa, can be taken freely without putting any strain on the kidneys. There is practically no chronic condition in which it cannot be prescribed with safety and advantage, for which reason it has enjoyed the confidence of the medical profession for more than 100 years.

M. & B. 693 IN THE TREATMENT OF PNEUMOCOCCAL INFECTIONS (FOURTH EDITION)

THE considerable extension of the use of M. & B. 693 in the treatment of pneumococcal infections has resulted in the appearance of a new edition of the booklet on this product, a copy of which has been sent to us by the manufacturers, Pharmaceutical Specialities (May and Baker) Limited, Dagenham.

Reference is made in the booklet to a new packing in which the drug is now obtainable, a box of

6 ampoules of the sodium salt of M. & B. 693, supplied in India at Rs. 11-13. The manufacturers emphasize that this product is for intravenous or deep intramuscular injection. Details of administration are included in the booklet.

We understand that Messrs. May and Baker (India), Limited, 11, Clive Street, Calcutta, will be glad to send copies of this booklet on request to members of the medical profession.

A PRONTOSIL BOOKLET

It is not necessary to enlarge upon the importance of the contribution which 'Prontosil' has made towards the treatment of disease. Since its introduction in Germany, in 1935, 'Prontosil' has aroused the greatest interest throughout the world. The abundance of publications in the medical literature, however, makes it difficult for doctors to get a clear idea of the most important experimental and clinical facts that are now known about these drugs.

Bayer Remedies Limited has issued a book in which they have attempted to collect and classify these facts, so that information on any particular question can be readily obtained. Only the more important references (about one-fifth of the total available) have been chosen, and these give chapter and verse for all the statements made. The contents are arranged in three main sections—Experimental Findings, Clinical Experience, and Therapeutics—and are, we believe, more in the nature of a well-balanced review of the subject than a collection of summaries of published work.

The medical profession will find this an invaluable book of reference on this important subject.

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Original Articles

CLINICAL AND PROGNOSTIC FACTORS IN TYPHOID IN INDIA

By R. L. HAVILAND MINCHIN, M.D.

CAPTAIN, I.M.S.

*Late Additional Professor of Medicine, Medical College
and Physician, General Hospital, Madras*

IN spite of improvements in sanitation, the treatment of the enteric group of fevers still forms one of the major problems of the medical man in tropical countries, for example, in 1936, the last year for which complete statistics are available, 1,363 cases of enteric fever were treated at the Madras General Hospital.

Medical literature reveals an astounding series of contradictory statements on the subject of enteric in the tropics. Thus, while Manson-Bahr (1935) speaks of 'the well-known immunity of native races', Rogers and Megaw (1935) state that typhoid is very frequent in India, while Lakin (1937) insists that para-typhoid A is pre-eminent.

During 1936-1938, when the 444 cases of typhoid mentioned in this paper were in hospital, only three cases of para-typhoid A and two of B were admitted, and Uttley (1938) reports a similar overwhelming majority of typhoid infections among the enteric cases in Hong-Kong.

For the purpose of this paper, the case reports of all cases of the enteric group of fevers admitted to three comparable units of the Madras General Hospital during the period under investigation were examined. All the cases showing definite bacteriological evidence were included in the examination; by that is meant all cases from which enteric organisms were isolated or those cases showing a Widal agglutination at least 1 in 200 dilution. This may be an insufficiently high concentration for definite diagnosis: though Box (1937) considers that any agglutination over 1 in 50 should be considered positive, and Lewin (1938) states that after examination of over twenty-thousand sera, he considers that, in the uninoculated, such as were these, a 1 in 100 H and 1 in 200 O agglutination are suitable for diagnosis. Taking these figures he has found an error of under 3 per cent. I agree that a certain rise in blood agglutinins can occur in an old typhoid case or previously immunized individual suffering from any fever; but with the possible exception of tropical typhus, a titre as high as 1 in 200 will very rarely be obtained. In favour of this view is the fact that in only 3.6 per cent of the cases examined was there any rise in agglutinins towards other organisms of the enteric group, and where this did occur the titre was never over 1 in 50.

The methods of examination of suspected enteric cases in this hospital should be mentioned. As a routine, all patients with fever are

first examined for malaria and a blood film is taken. If no parasites are discovered the next day, and if the temperature has not returned to normal, blood is taken for culture and Widal. In this way the blood of many patients showing signs and symptoms suggestive of dengue, broncho-pneumonia or malaria is examined, and it will be seen that a large proportion are found to be culturally or serologically typhoid, a fact that has been emphasized by Box (1937). Unfortunately, it has been found impossible to carry out the routine examinations to a titre of over 1 in 200, and where 1 in 200 is shown as the titre of the serum it should be read as 'at least 1 in 200'.

Consideration of treatment.—In the absence of any universally recognized specific treatment, it is not surprising that individual physicians have their own methods which they are convinced produce satisfactory results. In this hospital, opinion ranges between the classical low diets, almost to the administration of the very high calorific diets advocated by Coleman (1917). It was to demonstrate the comparative complication rate and ultimate prognosis with vastly different methods of treatment that this report was produced. A short summary of the routine lines of treatment followed in the three medical units is given below:—

Physician A, for the first ten days of the fever, allows his patients three pints of citrated milk daily with small quantities of bread and butter, and such light foods as ground rice or blanc-mange *congee*. In addition to this, he gives orange juice, cod-liver oil and Marmite soup to prevent the development of vitamin deficiencies. After the tenth day, the solid part of the food is stopped and only the three pints of milk, blanc-mange and the vitamin concentrates continued. Any constipation is treated by glycerine enemata.

Physician B gives a diet nearer the classical starvation type. During the fever only two pints of milk and a little barley water or arrowroot are permitted with orange juice and glucose. Only after the fever has been normal for two days is higher diet permitted. Constipation is not regarded with concern, but if it is persistent it is treated with glycerine enemata, and, if associated with distension, with fractional doses of calomel.

Physician C (R. L. H. M.) attempts to keep all typhoid cases on a diet of at least 2,500 calories consisting of milk products, ground rice, jellies, biscuits, arrowroot, bread, butter, vegetables, etc.

This diet is maintained throughout the fever provided that the patient is willing to eat it, the only reason for stopping it being the development of abdominal distension, diarrhoea, or hæmorrhage. In addition any constipation of over one day is dealt with by the administration of one drachm of castor oil daily, with the object of obtaining at least one soft motion daily. The idea being that a paralysed gut in constant

contact with toxins is far more likely to become distended, to perforate, or bleed than one kept in a state of mild peristalsis by the use of small doses of an aperient. The method is a modification of that introduced by Cree and Carter (1907) and advocated by Colonel S. G. S. Haughton. It need hardly be mentioned that such a line of treatment is looked upon with horror by the bulk of orthodox physicians (Box, 1935).

It should be mentioned that the lines of treatment given above are what are attempted, and are not always obtained, as certain of the patients refuse to take the diets and medicines prescribed.

Results of treatment

These can be seen in table I, which gives the symptoms on admittance, the complications and results in each unit, and in table II which shows the cause of death.

Table I shows that the average length of fever (in recovered cases) was almost the same in each unit (24 days) and the mortality figures (13.7 per cent) show no real difference, the number of 'bowel complications', i.e., tympanites, perforation, hæmorrhage and diarrhœa being for Physician A (low diet) 23 per cent, Physician B (lower diet) 27 per cent, and Physician C (higher diets and open bowel) 21 per cent. Examination of table II which gives the causes of death in each unit shows that in unit 1 bowel complications produced four deaths, in unit 2 seven and unit 3 three. From these figures it might be argued that the method of open bowel therapy reduces the death rate from the bowel complications; but the total death rate is approximately the same in each unit. Nevertheless, the figures do show that the administration of purgatives in moderate doses produces no adverse effect, and I am convinced that it gives the patient far more relief than the usual method of only emptying the lower bowel by means of enemata.

Symptoms on admittance—table I

Unfortunately patients are liable to be admitted at any stage of the disease and consequently these figures have only a limited value, and the hope that a study of the symptoms on admittance might give a clue as to which cases were likely to prove serious was disappointed; however, the table does bring to light certain significant points. The first is that diarrhœa or constipation as a primary symptom is rare, totalling only 7 per cent. The second is the frequency of cough. The importance of this as a primary symptom in typhoid does not appear to have been realized, though Willcox (1938) mentions that it may occur. Nearly a quarter of the cases were admitted complaining of cough, and as 17 per cent developed bronchitis and 11.8 per cent broncho-pneumonia, a condition having a mortality of 40 per cent (table I), this raises

an important point. The procedure recommended in many textbooks of tropical medicine is to send specimens of blood from all cases of 'fever of unknown origin' for Widal and culture. In my opinion, many cases that have fever which appears to be due to bronchitis or broncho-pneumonia are not submitted to bacteriological examination, and consequently the true nature of the disease is missed. I consider, in tropical countries, all broncho-pneumonias should be suspected as being due to typhoid and investigated as such.

Headache was complained of in 20 per cent of the cases on admittance; the pain was referred to no particular area more than another. The symptom of rigor (6 per cent) should be noted; these might easily give rise to an erroneous diagnosis of malaria.

The absence of rose spots should be noted. The rash can rarely be seen in an Indian skin.

Enlargement of the spleen is not mentioned, actually it is rare, and when found where malaria and kala-azar are rampant is of no diagnostic value.

Epistaxis occurred in none of the cases.

Whatever symptoms a typhoid case showed on admittance to hospital the mortality is almost the same, with the exception of those admitted with diarrhœa who had a mortality of even twice the average.

Bacteriological tests

In all cases reported the blood was examined for the presence of organisms and for the Widal titre; if either was positive, no further bacteriological examinations were made. The patients were uninoculated, and the necessity of finding a rise in Widal titre, which is essential to establish a diagnosis in inoculated persons, was unnecessary. Unfortunately, the pressure of work on the bacteriologist prevented repetitions of the examination. In spite of these obvious deficiencies, and the arrival of many of the patients at a late stage of the disease, 50 per cent of the cases showed a positive blood culture.

There appears to be a widespread belief that blood culture is only normally positive in the first ten days. In this series though 71 per cent of the positive cultures were obtained in the first ten days as many as 11 per cent were found after the 15th day of the disease, one being as late as the 25th day.

Lantin (1933) investigated the cases showing positive culture in Manila and concluded that a positive culture indicated a bad prognosis, the mortality being three times as high as among negatives; and rising with the length of time the organisms persisted in the blood. The cases here do not support this view. In blood-positive cases the mortality was only 16 per cent compared with the average of 13.7 per cent. The period of the disease in which the organisms were isolated made no difference. This finding is supported by Lewin (1938) who found that

TABLE I
Summary

	Total	Physician A		Physician B		Physician C		Recovered cases		Cases in which death occurred		Per cent died
<i>Number of cases</i> ..	414	151		146		147		383		61		13.7
		Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	
<i>Symptoms on admission—</i>												
Cough ..	101	36	24.0	40	27.0	28	19.0	90	23.5	14	23.0	13.5
Rigor ..	46	15	10.0	22	15.0	9	6.1	39	76.0	7	11.5	15.2
Pain in back or limbs ..	33	16	10.6	7	4.8	10	6.8	30	7.8	3	5.0	9.0
Headache ..	117	43	28.5	29	19.8	45	31.0	104	27.0	13	21.0	11.0
Tympanites ..	3	3	2.0	..	..	..	..	3	0.8	..	..	..
Retention ..	7	4	2.6	..	..	3	2.0	7	1.8	..	..	..
Vomiting ..	8	4	2.6	4	2.7	..	..	7	1.8	1	1.6	12.5
Pain in abdomen ..	14	4	2.6	5	3.4	5	3.4	12	3.0	2	3.3	14.7
Constipation ..	13	2	1.3	8	5.5	3	2.0	12	3.0	1	1.6	0.8
Diarrhoea ..	18	4	2.6	13	8.9	1	0.7	13	3.4	5	8.2	28.0
Culture positive ..	213*	67	44.5	74	49.0	70†	54.0	179	46.5	34	56.0	16.0
<i>Mean length of fever</i> ..		24.4		24.8		23.2		23.2				
<i>Type of fever—</i>												
Continuous ..	260	90	60.0	74	49.0	96	65.0	214	56.0	46	75.0	17.5
Irregular ..	106	37	24.5	35	24.0	34	23.0	96	25.0	10	16.0	9.4
Remittent ..	55	17	11.2	29	27.0	9	6.1	52	13.6	3	5.0	5.5
Intermittent ..	23	7	4.6	8	5.5	8	2.7	21	5.5	2	3.3	8.7
<i>Complications—</i>												
Hyperpyrexia ..	21	8	5.3	6	4.1	9	6.1	16	14.0	5	8.2	24.0
Perforation ..	4	..	..	4	2.7	..	..	..	..	4	65.0	100.0
Hæmorrhage ..	16	7	4.6	5	3.4	4	2.7	8	2.0	8	13.0	50.0
Tympanites ..	51	17	11.2	18	12.3	16	11.0	40	10.0	11	18.0	22.0
Bronchitis ..	76	22	14.6	27	18.5	27	18.0	68	18.0	8	13.0	10.5
Broncho-pneumonia ..	52	17	11.2	16	11.0	19	13.0	31	8.0	21	34.0	40.0
Cystitis ..	33	16	10.6	7	4.6	10	6.8	28	7.0	5	8.0	15.0
Diarrhoea ..	34	11	7.6	12	8.4	11	7.5	28	7.0	6	10.0	17.7
Delirium ..	23	8	5.3	6	4.1	9	6.1	12	3.1	11	18.0	48.0
Parotitis ..	16	6	4.0	4	2.7	6	6.1	15	4.0	1	16.0	6.2
Cardiovascular failure ..	36	9	6.0	16	11.0	11	7.5	10	2.6	26	24.0	72.0
<i>Relapse</i> ..	29	13	8.6	8	5.5	8	5.5	27	7.0	2	3.3	6.9
<i>Deaths</i> ..	61	20	13.2	19	13.0	22	14.9	..	..	..	..	..

* in 426 cases.

† in 129 cases.

TABLE II

Cause of death	Physician A	Physician B	Physician C	Totals	Per cent of deaths
Broncho-pneumonia ..	7	2	8	17	28.0
Cardiovascular failure ..	7	7	9	23	38.0
Toxæmia ..	1	3	1	5	8.2
Perforation ..	0	4	0	4	6.5
Hæmorrhage ..	3	2	2	7	11.5
Diarrhoea ..	1	1	1	3	4.9
Hyperpyrexia ..	1	0	1	2	3.8

the death rates in mice have no relation to the presence or absence of bacteriæmia.

Types of temperature

The severity of the infection or the prognosis bore no relationship to the type of fever.

Complications

As there is yet no generally recognized specific therapy for typhoid, treatment consists

mainly in the prevention and treatment of complications. Some complication occurred in over 80 per cent of the cases.

Perforation.—That perforation is the complication above all others to be avoided is well demonstrated here where there was a mortality of 100 per cent in the four cases perforating. On the other hand, perforation only occurred in 0.9 per cent of the cases. This figures should be compared with the 4 per cent mortality from

TABLE III
Relapsed cases

Reference number	Duration of fever on admission	Age	Widal in main fever	Culture in main fever	Duration of primary fever	Length of intermediate period	Duration of relapse	Widal in relapse	Culture in relapse	Result
<i>Relapses Unit A</i>										
25	7	25	200	—	11	8	21 +	—	+	Death C.V.
36	5	20	50	+	15	13	6	—	+	R
66	11	25	200	—	24	10	6	—	—	R
76	5	10	200	+	19	11	10 +	200	+	R
80	14	37	800	—	20	7	9	800	N	R
92	5	9	200	U +	25	15	5	—	U and F +	R
99	7	18	400	+	29	10	15	400	—	R
116	15	12	200	+	21	6	14	200	—	R
109	19	10	200	+	20	2	15	—	—	R
115	3	19	100	+	21	3	17	600	—	R
127	5	18	800	—	17	2	30	800	+	R
142	10	14	1,000	—	20	13	10	—	—	R
143	6	8	0	+	18	12	6	—	—	R
<i>Unit C</i>										
3	8	28	200	—	42	20	18	400	N	R
17	6	22	100	—	13	11	12	400	N	R
64	4	20	200	+	21	5	10	—	—	R
88	4	29	200	+	18	11	7	B50	+	R
92	5	18	200	+	25	5	16	400	+	R
95	4	9	200	+	16	10	10	200	+	R
115	6	12	25-200	—	20	8	9	800	—	R
117	4	12	200	+	12	6	15	800	+	R
125	5	12	100-200	—	15	7	20	200	N	R
<i>Unit B</i>										
13	14	7	200	—	22	8	4	—	—	Died C.V.
32	6	8	200	—	16	6	6	—	—	R
41	5	22	50-200	—	19	9	20	—	—	R
60	11	44	200	—	26	12	10	—	—	R
95	8	29	200	+	18	10	7	—	—	R
102	20	17	200	—	28	12	10	—	+	R
130	7	13	100	+	17	6	7	—	+	R
138	4	15	100	—	18	9	16	800	N	R

N = Negative.

R = Recovered.

— = Result not available or not done.

U and F + = Urine and faeces culture positive for *B. typhosus*.

B50 = Widal 1/50 positive *B. paratyphosus B.*

perforation mentioned by Lakin (1937) and the 4.7 per cent of Goodall (1928) and the latter's statement that this complication is responsible for a third of his typhoid deaths.

The other important bowel complication was hæmorrhage; this occurred in only 3.6 per cent of the patients half of whom died. An individual case merits special notice as two very large hæmorrhages occurred, necessitating transfusion, the remarkable feature being that they came on not during the fever, but 10 days and 12 days after the temperature had become normal.

Cases developing diarrhoea in hospital were small in number, both on the low and high diets, but the prognosis of these patients was bad, 40 per cent dying.

Tympanitis developed in 11.5 per cent cases and was associated with a higher mortality (22 per cent) than the average.

Toxæmia.—Marked toxæmia was shown by the development of delirium, hyperpyrexia or cardiovascular failure.

Delirium only developed in 5.2 per cent of the cases of which half recovered without special treatment except sedatives, which is exactly the same proportion which Schwartzman, Baehr and Hollingsworth (1936) obtained by treating delirious cases with serum.

Hyperpyrexia occurred in 5 per cent of the cases and was directly responsible for two deaths, though 24 per cent of the cases showing this symptom finally succumbed to the disease.

Cardiovascular failure.—The exact nature of the condition still seems to be undecided. Porter and Bloom (1935) made a study of the heart in typhoid and concluded that this organ presented no significant problem, anyhow when the disease was treated with high diets. Kelly in a paper by Murray and Kelly (1938) stated

on clinical grounds that the cardiovascular failure was due to myocarditis, and Lakin (1937) appears to have the same view; Ying (1935) however came to the remarkable conclusion that his cases of typhoid showing cardiovascular failure were suffering from beri-beri.

Here cardiovascular failure occurred in 6.5 per cent but had a mortality of 72 per cent. It is of interest to note that the lowest mortality occurred in the case of Physician A where vitamin B in the form of Marmite soup was given.

Cardiovascular failure was responsible for 38 per cent of the total deaths and produced a higher mortality than any other single complication.

Bronchitis and broncho-pneumonia.—These have been discussed under cough as a primary symptom. Box (1937) emphasizes this complication.

Relapses

Relapses occurred in 6.5 per cent of cases. Particulars are shown in table III. The mortality was only 6.9 per cent, *i.e.*, under half the standard death rate. This figure is surprising as it would be expected that in weak convalescents relapsing, there would be a higher mortality.

It was hoped that a study of these cases would give some information on the nature of relapses. Unfortunately it is impossible to say which cases are likely to relapse and consequently special study cannot be made in the main fever. It has been suggested that relapses are likely to occur where the rise in blood agglutinins is low in the primary attack, but case A 142 is against this for even a Widal of at least 1 in 1,000 was not sufficient to prevent a relapse. Blood culture was positive in 64 per cent of the cases in the relapse where it was investigated.

Deaths.—Death occurred in 13.7 per cent of the cases. The death rate was approximately the same in each unit despite the different treatments. It is worth noting though not necessarily of significance that all the cases of perforation occurred where the lowest diet was given. Other bowel complications were equal in each unit. This fact demonstrates conclusively that small doses of purgatives as given in unit C have no adverse effect, and I am convinced myself that they give the patient considerably more satisfaction and remove more toxins than do any type of enema.

Over 40 per cent of cases died after the third week of the disease and the mortality was not influenced by the age of the patient.

Treatment.—Financial considerations making the use of Felix serum impossible, routine dietetic treatment had to be relied on. The results obtained by the classical semi-starvation, modified semi-starvation with vitamin preparations

and fairly high diet with modified 'open bowel' methods were almost exactly the same.

Prognosis.—The general mortality is 13.7 per cent. The prognosis in cases admitted with each symptom and developing each complication are shown in table I. The only really bad symptom on admittance is diarrhoea which cases have twice the normal mortality.

Summary

Four hundred and forty-four cases of typhoid have been studied. The only symptom of adverse significance on admittance is diarrhoea. The blood cultures were found to be the same in recovered or dying cases. The chief cause of death was cardiovascular failure. The few cases of perforation gave 100 per cent mortality and all occurred in patients on a starvation diet. Bowel complications were lowest in those cases treated with small doses of castor oil. The general mortality and length of fever was almost the same in each unit in spite of the different treatments.

I am grateful to Lieut.-Colonel G. R. McRobert, I.M.S., and Dr. M. R. Guruswami Mudaliar for permission to use their case reports, to my house physician Dr. B. Devadoss for his untiring assistance in the collection of the figures, and to Lieut.-Colonel M. M. Cruickshank, I.M.S., Superintendent of the Madras General Hospital, for permission to publish this report.

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CLINICAL OBSERVATIONS ON WEIL'S DISEASE IN INDIA

By N. R. KONAR, M.B.

Senior House Physician, Medical College, Calcutta

H. K. ROY, M.B.

Medical Registrar, Medical College, Calcutta
and

M. N. DE, M.B. (Cal.), M.R.C.P. (Lond.)

Professor of Medicine, Medical College, Calcutta, and
First Physician, Medical College Hospitals

(From the Department of Medicine, Medical College,
Calcutta)

THOUGH more than fifty years have elapsed since Weil first described his syndrome, and twenty-five years since Inada and Ido described the causal organism, leptospirosis remains only a recently-studied subject in India. A large number of publications have recently been made from different parts of the world, and 142 authenticated cases of the disease in an obvious clinical form have been reported in the British Isles alone (Manson-Bahr, 1938) during the last three and a half years.

The subject of leptospirosis was discussed recently in this journal (May, 1938) by Dr. L. E. Napier in his editorial capacity; he gave a good clinical description of the disease, but we consider that, as Weil's disease is still rare enough in this country to make its recognition difficult unless its clinical manifestations are familiar and the possibility of its occurrence is borne in mind, this further clinical report seems justified. It is true that epidemics clinically suggestive of Weil's disease have been reported from time to time (Tucker in Bombay in 1907; Franklin in Kashmir in 1913; Paramanand in Bombay in 1922; Pandit and Rao in South India in 1932) but it was not until 1937 that Das Gupta and Chopra reported the first proven case of leptospirosis in India from Calcutta. Since then, Das Gupta (1938) has reported five more cases of leptospiral jaundice in Calcutta. Knowles (1928) and Taylor and Goyle (1931) had foreseen the possible existence of Weil's disease in India and bacteriological advancement in the country has at last fulfilled the vision of these workers.

Weil's disease is a serious malady and its mortality rate as recorded by different writers varies from 10 to 50 per cent of all cases. Specific treatment in the form of antiserum will soon be available and may be of great value if administered early and in large doses.

Five cases of Weil's disease were treated in the ward of one of the writers (M. N. D.) during the last year and a half. In addition to these he had under his care another possible but unproven case. The clinical pictures of Weil's disease are not very familiar in this country as it is interesting to note that only one of the cases was admitted as such and the rest were variously labelled, *viz.* pneumonia, catarrhal jaundice, influenza, and malignant malaria.

The diagnosis should escape no one when jaundice, associated with nephritis and nitrogen

retention, has followed upon an acute febrile illness in which severe headache, agonizing pain all over the body specially in the lumbar region, cramps in the calf muscles, conjunctival congestion and scattered hæmorrhages have been well marked. But the difficulty lies in the fact that at least 50 per cent of these cases never become jaundiced. Hæmorrhages from different mucous surfaces are also not very common. Davidson and Smith (1936) found icterus in 60 per cent and hæmorrhages in only 18 per cent of their cases. Moreover, the icterus usually does not appear before the third day of the disease and hæmorrhages are rare before the second week. The disease in Calcutta is not confined to individuals engaged in any particular occupation (Das Gupta, 1938). Nor has it been particularly associated with rats, though scarcely any house in Calcutta is free from rats.

However, in the very earliest stages the clinical picture is suggestive enough to make justifiable the use of serum before the diagnosis is confirmed. Sudden onset of a severe illness with headache, high fever, severe pain and great tenderness in the limb muscles, marked prostration, conjunctival congestion with slight icteric tinge and slightly enlarged and tender liver, should make one suspect the disease.

The very fact that all the cases that have so far been reported from the Medical College Hospitals, Calcutta, should have come under the eye of one physician would suggest that cases must have been occurring but have not been recognized and that a fuller and wider knowledge of the infection and its manifestations would bring to light other cases. It is with this end in view that these cases are here reported in full.

Case 1.—H. C. B., male, aged 28, cook; admitted on 22nd December, 1937. *Complaints:* Fever, cough, pain on the left side of the chest. *Habits:* moderate smoker. No addiction to alcohol. Previous history regarding health satisfactory. A year ago he had an attack of pneumonia.

History of the present illness.—Four days prior to admission the patient had a sudden attack of fever with chill, rigor and vomiting. He had severe headache and marked pain all over the body, especially in the calf muscles and over the left side of the chest. The urine was highly coloured, the bowels constipated. The vomiting, which was present at the onset, persisted and at the time of admission the patient was unable to retain even sips of water.

Physical examination.—Temperature 100°F.; pulse 100, and respiration 26 per minute. Patient looked toxic and was restless, conjunctivæ congested and icteric. Tongue dry and coated, throat moderately congested. Superficial lymph glands not enlarged. Liver enlarged one finger's breadth below the costal margin; it was soft and tender. Spleen not palpable. No other abnormality detected.

Laboratory examinations.—Blood: hæmoglobin 70 per cent. Red blood cells—3,950,000 per c.mm. White blood cells—16,875 per c.mm. Polymorphonuclears 85 per cent; lymphocytes 11 per cent; monocytes 2 per cent; eosinophiles 2 per cent. No malarial parasites seen.

Urine—Slightly hazy, deep yellow; specific gravity 1010; alkaline, albumen and bile—present; occult blood—nil. No other abnormality detected.

Van den Bergh reaction—Immediate direct strongly positive; bilirubin content—16 units. Direct examination of 6 smears from peripheral blood under the dark-ground illumination showed no leptospira. Examination of half a dozen films stained by Tribondeau's modification of Fontana's method showed no leptospira.

Blood culture (6th day of disease):

(a) on glucose broth—sterile,

(b) on Fletcher's medium—a scanty growth of leptospira on the 30th day of culture.

Animal inoculation (6th day)—Two young guinea-pigs were given intraperitoneal injections with the patient's blood. Both the animals developed typical signs of leptospiral infection and died on the 7th and the 8th day of inoculation, respectively.

Urine examination for leptospira—Centrifugalized deposits of five specimens of freshly-voided urine obtained between the 15th and 25th day of illness were examined under the dark-ground illumination with negative results. Protection experiments—The patient's serum protected guinea-pigs against the strain isolated from the patient himself, but failed to do so in guinea-pigs inoculated with a different strain.

Progress of the case.—Fever, headache, vomiting and toxæmia persisted for the first four days after admission. Temperature gradually settled down on the 8th day of the disease. On the 9th day it shot up to 101°F. but came down again to normal on the next day. There was a secondary rise of temperature to 102°F. on the 21st day of the illness. This, however, came down to normal within twenty-four hours. Bowels were constipated throughout the illness. The urinary output was quite good varying between 30 and 60 ounces in twenty-four hours. The jaundice gradually lessened and was completely absent a month after admission. Throughout the whole course the patient was markedly weak and prostrated.

Case 2.—M. B., male, aged 28, bearer; admitted on 14th October, 1938. *Complaints:* Bleeding from the gums, passage of tarry stools, jaundice, marked diminution in the urinary output, hiccough and vomiting.

History of the present illness.—Fifteen days prior to admission, the patient had a sudden attack of fever with headache, chill, rigor, vomiting and pain all over the body. The fever lasted for two days. He started having melena and bleeding from the gums three days prior to admission. The day of illness in which jaundice was first noticed could not be ascertained.

Physical examination.—Patient looked seriously ill and was in a semi-conscious state; temperature 98°F.; pulse 88 and respiration 26 per minute; jaundice marked; tongue dry and coated; conjunctivæ congested; gums bleeding; petechial spots scattered over the body; face, legs and feet oedematous; superficial lymph glands not enlarged; abdomen tympanitic; liver soft, tender, two fingers' breadth below the costal margin; spleen not palpable; heart sounds faint; no other abnormality detected.

Laboratory examinations.—Blood: hæmoglobin 45 per cent. White blood cells—12,000 per c.mm. Polymorphonuclears 90 per cent; lymphocytes 9 per cent; monocytes 1 per cent. No malarial parasites seen.

Urine—Deep brown, alkaline, hazy, specific gravity 1010, albumen and bile present; occult blood test negative. Microscopically—bile stained epithelial cells.

Blood culture—No growth; agglutination reaction to enteric group of bacilli—negative. Wassermann reaction of blood strongly positive.

Blood chemistry—Urea 410 mgm. per cent; N.P.N. 245 mgm. per cent; cholesterol 262 mgm. per cent. Van den Bergh reaction—immediate direct strongly positive; bilirubin content—32 units.

Blood examination for leptospira—Blood was taken for serological tests alone, the patient having come to the hospital on the 16th day of illness. As the serum did not give any significant reaction with the local strain and as it failed to protect young guinea-pigs against this strain, a little of it was sent to

Professor Schöffner's Laboratory at Amsterdam. The serum reacted with a rat strain isolated from a field rat (*R. brevicaudatus*) in Semarang (Java) in a high dilution (1 in 1,000).

Progress of the case.—The jaundice and coma deepened and complete suppression of urine followed. Bleeding from the gums continued. The temperature ran a subnormal course except on the day of death, when it went up to 99°F. Blood pressure recorded on the day prior to death was 130/90 mm. of Hg. Patient died on the 18th day of illness.

Case 3.—M. A., male, aged 55, labourer; admitted on 18th March, 1939. *Complaints:* Fever and jaundice. Previous history regarding health satisfactory.

History of the present illness.—Eighteen days prior to admission the patient had an attack of fever which came on insidiously without any chill, rigor or vomiting. He had headache and marked pain all over the limbs. He developed jaundice three days after the onset of the illness. His urine was high coloured and bowels were constipated.

Physical examination.—On admission the temperature was 97°F.; pulse 100 and respiration 24 per minute; prostration marked; tongue very dirty; conjunctivæ markedly icteric. Superficial lymph glands not enlarged; liver soft, tender and enlarged, one finger's breadth below the costal margin; spleen not palpable. A few petechial spots on the chest and the back; no other abnormality detected.

Laboratory examinations.—Blood: hæmoglobin 65 per cent. Red blood cells—3,400,000 per c.mm. White blood cells—15,600 per c.mm. Polymorphonuclears 88 per cent; lymphocytes 11 per cent; monocytes 1 per cent. No malarial parasites seen.

Urine—Brownish, acid, hazy, albumen—present. Bile—nil. Indican—present, urobilinogen test strongly positive. Occult blood test positive. Microscopically a few pus cells, occasional red blood cells and a fair number of hyaline and granular casts.

Fæces—Occult blood test positive.

Blood and urine cultures—No growth. Widal reaction negative.

Blood chemistry—Urea 32 mgm. per cent; N.P.N. 22 mgm. per cent, calcium 8 mgm. per cent; chloride 410 mgm. per cent. Van den Bergh reaction—immediate direct positive; bilirubin content—11 units.

Serological reaction for leptospira—The serum of the blood taken on the 17th day of the disease reacted with 'Strain Chopra, Calcutta' (Das Gupta, 1938) in 1 in 80 to 1 in 160 dilution. The leptospira could not be isolated from urine.

Progress of the case.—The temperature was almost normal except on the 20th day of illness when it went up to 101°F. It came down on the next day and remained normal till his discharge. During the period, following a dose of calomel, his temperature rose to 102°F. but came down to normal within twenty-four hours. Along with this rise of temperature, his stools became very loose and continued to be so for a week. The urinary output was all along low, varying between four and thirty ounces in twenty-four hours. Bowels were very constipated except during the period following the intake of calomel. Generalized weakness was a very prominent feature. The jaundice gradually lessened and disappeared completely within a month from the onset of illness.

Case 4.—G. B., male, aged 40, gardener; admitted on 28th November, 1938. Patient was admitted in a semi-conscious state; he was having persistent hiccough and it was learnt that he had not passed any urine during the last twenty-four hours.

History of the present illness.—Seven days prior to admission the patient had a sudden attack of fever with chill, rigor and vomiting. The fever lasted for seven days. Since the morning of the day of admission, patient had hiccough and became drowsy. His bowels were constipated.

Physical examination.—Patient looked seriously ill, was semi-conscious and at times delirious; temperature 96°F.; pulse 70 and respiration 28 per minute; conjunctivæ congested; tongue dry and heavily coated;

jaundice marked; hicough present; abdomen tympanitic; liver soft, tender and enlarged two fingers' breadth below the costal margin; spleen not palpable; heart sounds faint, rhythm irregular; no other abnormality detected.

Laboratory examinations.—Blood: hæmoglobin 65 per cent. Red blood cells—3,760,000 per c.mm. White blood cells—12,500 per c.mm. Polymorphonuclears 80 per cent; lymphocytes 15 per cent; monocytes 3 per cent; eosinophiles 2 per cent. No malarial parasites found.

Blood chemistry.—Urea 150 mgm. per cent; N.P.N. 120 mgm. per cent; cholesterol 133 mgm. per cent; chloride 398 mgm. per cent. Van den Bergh reaction—immediate direct strongly positive; bilirubin content—45 units.

Serological test for leptospirosis.—As the serum did not give any significant reaction with the local strain, a little of it was sent by Dr. Das Gupta to Professor Schüffner's Laboratory at Amsterdam where it reacted with strain 'Andaman CH' in 1 in 30 dilution. No leptospira could be isolated from the blood or urine of the patient.

Progress of the case.—The patient became more and more drowsy. Complete suppression of urine ensued. Patient ultimately died on the 9th day of the disease.

Case 5.—G. H., male, aged 20, unemployed, admitted on 17th June, 1939. **Complaints:** Fever, headache, pain all over the body. Previous history regarding health satisfactory. Moderate smoker but not addicted to alcohol.

History of the present illness.—Three days prior to admission patient had a sudden attack of fever with chill, rigor and vomiting. He had severe headache and marked pain all over the body. The urine was clear. Bowels were constipated.

Physical examination.—Temperature 100°F.; pulse 100 and respiration 26 per minute. Patient looked toxic, dull and apathetic. Skin: generalized erythema. Conjunctivæ congested; tongue heavily coated; throat markedly congested. There was a slight icteric tinge of the conjunctivæ. Superficial lymph glands not enlarged. Liver soft, tender and enlarged one finger's breadth below the costal margin. Spleen not palpable. No other abnormality detected.

Laboratory examinations.—Blood: hæmoglobin 75 per cent. Red blood cells—4,100,000 per c.mm. White blood cells—10,608 per c.mm. Polymorphonuclears 78 per cent; lymphocytes 18 per cent; monocytes 2 per cent; eosinophiles 2 per cent. No malarial parasites found.

Urine.—Light yellow, hazy, alkaline, specific gravity 1020, albumen—present. Bile—nil. Occult blood test was negative. Microscopically no pus cells, no red blood cells, no casts.

Fæces.—Occult blood test positive.

Blood culture and Widal reaction were negative.

Blood chemistry.—Urea 33 mgm. per cent; N.P.N. 25 mgm. per cent; cholesterol 130 mgm. per cent; chloride 384 mgm. per cent. Van den Bergh reaction—immediate direct positive; bilirubin content—4 units.

Serological reaction for leptospirosis.—The serum of the blood taken on the ninth day of the disease reacted with 'Strain Chopra, Calcutta' (Das Gupta, 1938) in 1 in 80 to 1 in 160 dilution. Leptospira were isolated from the urine taken on the 10th day of illness.

Progress of the case.—The temperature went up to 102°F. on the evening of admission. It ran a remittent course varying between 99°F. and 101°F. On the twelfth day of disease, temperature came down to normal. The patient had a secondary rise of temperature to 100°F. on the twenty-fourth day of the disease which persisted for four days. The headache and pain all over the body persisted for a week from the onset of illness. The urinary output was quite good all along; it varied from 50 to 70 ounces in twenty-four hours. Bowels were very constipated. Prostration was marked.

In the following case, we suspected the possibility of leptospirosis but unfortunately the

diagnosis could not be confirmed by special investigations. In fact, there was no time for such investigations as the patient died within a short time of his admission.

Case 6.—S. M., male, aged 35, plumber, admitted on 19th September, 1939, in an unconscious state on the 6th day of illness with a history of fever for the first two days. On the morning of admission patient felt very weak. He became unconscious in the afternoon. Bowels were said to be constipated. Urine was small in quantity and high coloured.

Physical examination.—Patient unconscious and at times hoisterous. Conjunctivæ markedly icteric. Abdomen tympanitic. Liver and spleen were not palpable. No evidence of paralysis or paresis. Pupils equal and reacting to light. Neck soft. Plantar responses flexor. Tendon jerks slightly exaggerated. No other abnormality detected.

Laboratory examinations.—Blood: hæmoglobin 65 per cent. White blood cells—6,864 per c.mm. Polymorphonuclears 82 per cent; lymphocytes 13 per cent; monocytes 2 per cent; eosinophiles 3 per cent. No malarial parasites found.

Urine.—High coloured, clear, slightly alkaline, albumen present. Acetone—trace. Bile—present. Microscopically a few pus cells and epithelial cells. Biochemical and serological investigations could not be undertaken.

Progress of the case.—The depth of coma gradually increased. Urinary output was markedly diminished. On the morning of his death, his temperature shot up to 101.5°F. Pulse became imperceptible, respiration hurried, and patient expired on the 7th day of his illness from pulmonary oedema.

Comments

It will be noticed that though the occupation of the different patients varied, all of them belonged to the poorer and working class of society. They resided in rooms on the ground floor where rat infestation is quite common. It is probable that rats were not responsible for the infection in these cases; they might have derived the infection from water or mud. The work of a gardener, labourer and plumber particularly favours such a mode of infection. Wolbach and Binger (1914) in America and Taylor and Goyle (1931) in the Andamans have been able to demonstrate leptospira in water and soil of places where leptospirosis was prevalent. No work in this connection has yet been carried out in India. Though rat infestation in the houses of Calcutta is quite common, leptospiral infection of the local rats is extremely rare. Knowles and Das Gupta (Knowles, 1932) found only two rats infected out of 193. Das Gupta (1938) reported that none of the 162 rats he examined showed leptospira. Nor was the agglutination reaction of the serum of these rats with local human strain of leptospira positive in any case. The observations of Taylor and Goyle (1931) in the Andamans also disprove the direct rôle of rats in the epidemiology of leptospirosis.

It will be further seen that the diagnosis of leptospirosis is particularly difficult in the tropics. Apart from diseases such as influenza, catarrhal jaundice, secondary syphilis, and septicæmia, tropical conditions such as malaria,

black-water fever, dengue, typhus, relapsing fever, and yellow fever have to be specially borne in mind. The first step in diagnosing leptospirosis is to remember the possibility of the disease. The next essential step is to undertake full bacteriological and serological tests. Regarding the latter, it is evident from case 2 and case 4 that it is not sufficient to test the serological reactions with local strains alone. It is necessary to match the reactions against strains isolated from different parts of the world. This has also been pointed out by Das Gupta (1938).

Summary

(1) A brief history of leptospirosis in India has been given.

(2) Complete case notes of five proved cases and one suspicious case have been recorded.

(3) Possible sources of infection in the reported cases have been discussed. It has been pointed out that water and soil may play an important part in the epidemiology of the Indian leptospirosis.

(4) Difficulties in the diagnosis of leptospirosis in the tropics have been pointed out. A plea has been made for the undertaking of full bacteriological and serological tests (using widely different strains of the organism) in all suspected cases.

Our sincerest thanks are due to Prof. B. M. Das Gupta for the special bacteriological and serological investigations carried out in all the cases. We are grateful to Lieut.-Col. J. C. De, I.M.S., Superintendent, Medical College Hospitals, Calcutta, for his kind permission to publish the cases, to Prof. P. De for the biochemical reports, to Prof. B. P. Tribedi for the bacteriological reports and to Dr. J. C. Banerjee for his valuable suggestions.

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TREATMENT OF LOBAR PNEUMONIA WITH M. & B. 693

By N. D. JEKYLL

CAPTAIN, I.M.S.

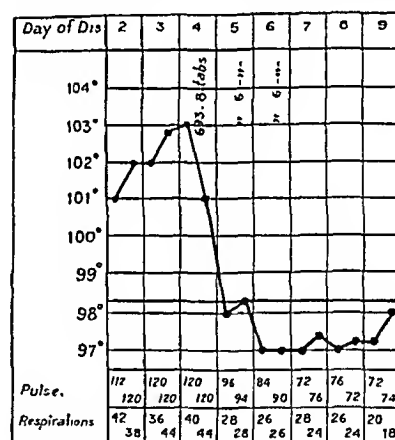
Indian Military Hospital, Peshawar

MUCH has been written about the treatment of lobar pneumonia with M. & B. 693 (2-sulphanilyl-aminopyridine), but it might be of some interest to record its action on pneumonias met with in the North-West Frontier Province of India.

During the past winter 15 cases have been treated with this preparation in the Indian Military Hospital, Peshawar. The majority were young healthy males leading an active life, and consequently one would not expect a high mortality rate. For the same period in 1937-38 the death rate in this hospital from lobar pneumonia was ten per cent.

Unfortunately, no typing of the organism was carried out.

Administration of the preparation was commenced on the second, third or fourth day of the disease, the cases previously receiving local treatment and, if necessary, hypnotics at night.



A typical case.

The results, which are also given in the accompanying table, were as follows :—

Eleven patients had an immediate response in 24 hours, their general condition being considerably improved and within 48 hours the temperature had fallen to normal by crisis.

One patient immediately responded by lysis, his temperature being normal by the eighth day.

One patient showed an immediate response, but developed signs in the opposite lung. Continuation of the preparation brought about a crisis on the eighth day.

One patient responded in 72 hours.

The remaining patient was admitted in an extremely toxic condition requiring oxygen and stimulants before administration was started and died after receiving only four tablets.

With this single exception it was found that none of the patients required any other drugs,

as their general condition never gave rise to anxiety. They slept well and were not troubled by dyspnoea, cough, pain, or delirium after the onset of treatment with M. & B. 693. Whereas

onset of the treatment being nearer the crisis or to the formation of some immunity.

(2) Where less than a total of eight tablets were given on the first day of administration or

TABLE
Summary of cases treated with M. & B. 693

Case number	Severity of condition	Day of onset of treatment	Day temp. reached normal	Day pulse reached normal	Day resp. reached normal	Temp. at onset of treatment	Temp. 24 hrs. after onset	Dosage number of tablets	Number of days	Complications	Further progress
1	+	3	5	5	8	103.8	102.0	20	3rd to 5th	None	Rapid recovery.
2	+	4	5	7	9	103.0	97.8	20	4th „ 6th	„	„
3	0	3	5	5	9	103.0	100.0	20	3rd „ 5th	„	„
4	0	4	6	8	9	102.8	100.0	23	4th „ 7th	„	„
5	0	4	5	6	7	104.0	97.4	18	4th „ 6th	„	„
6	0	2	3	4	8	103.0	98.0	16	2nd & 3rd	„	„
7	0	3	8	8	11	103.2	103.4	22	3rd to 6th	Fell by lysis	„
8	++	3	„	„	„	„	„	4	3rd	„	Died.
9	+	3	8	13	13	103.2	101.6	29	3rd to 8th	Developed signs in opposite lung rapidly cleared.	Rapid recovery.
10	0	3	6	6	11	103.8	102.2	17	3rd „ 5th	None	„
11	0	4	6	8	8	103.0	101.0	16	4th „ 6th	Rise of temperature on 18th day, given 9 tablets, settled.	„
12	+	3	5	5	8	101.6	98.2	17	3rd „ 5th	None	„
13	0	3	6	8	11	102.2	98.0	20	3rd „ 6th	Rise on 5th day with increase of symptoms.	„
14	0	4	5	5	9	102.0	98.0	17	4th „ 6th	None	„
15	0	2	4	5	9	101.4	98.4	17	2nd „ 4th	„	„

In column 2 { 0 = Case of average severity.
+ = Case of marked severity.
++ = Case of extreme severity.

in past years many cases have required constant nursing, oxygen and stimulants, this year no case treated with this preparation has needed any of these.

The average day on which the temperature reached normal was the fifth day, the pulse rate on the sixth day and the respiration rate on the ninth day.

The dosage which seemed to give the best results was a total of eight 0.5 gramme tablets on the first day of treatment made up of an initial dose of four tablets followed up by two tablets four hourly. On the second and third day a daily total of six tablets made up of two tablets four hourly and if necessary a further three tablets on the fourth and fifth days in four-hourly doses of one tablet. No tablets were administered during the night.

One of the above patients had very slight vomiting, but showed no other ill effect. Systematic blood counts were carried out and no ill effect was observed.

The following two points were noted during administration:—

(1) Treatments started on the fourth day appeared to give slightly better results than those started earlier. This may have been due to the

less than six on the second day the cases did not tend to show such a dramatic recovery.

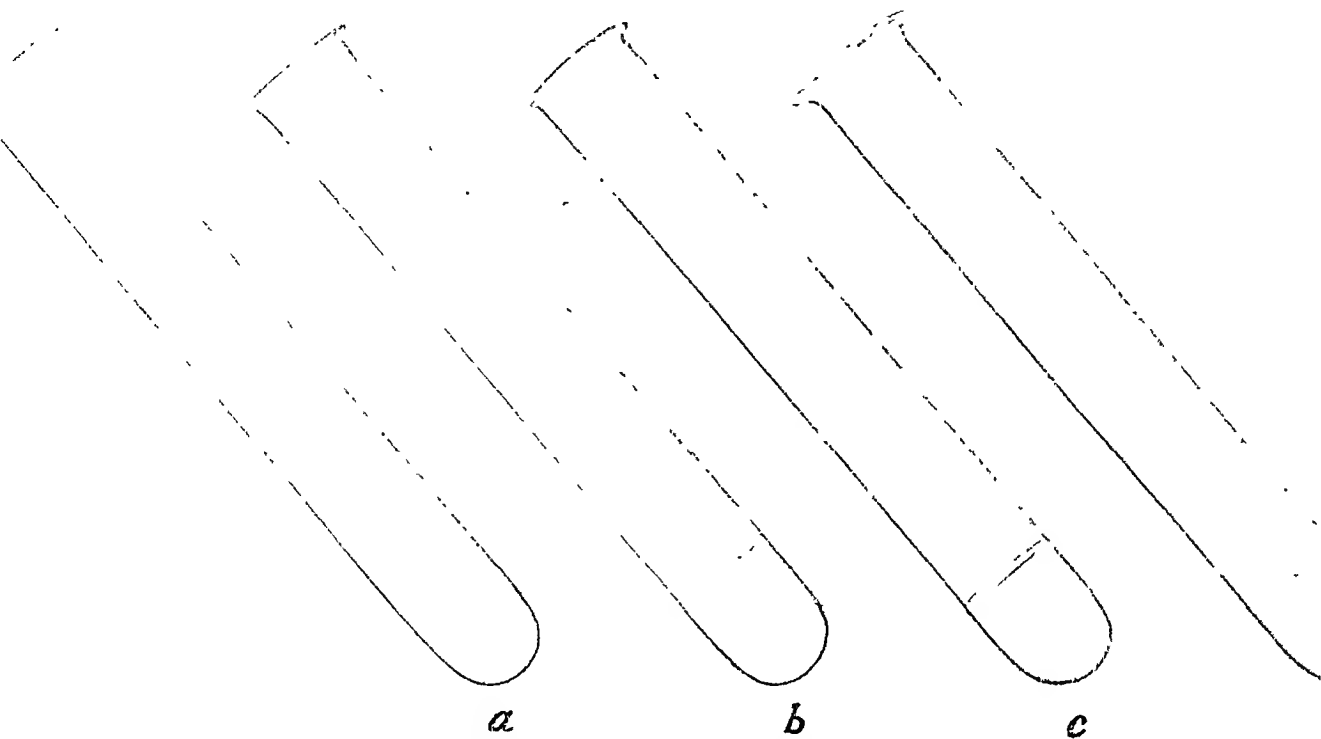
THE DIAGNOSIS OF KALA-AZAR IN DISPENSARY PRACTICE

By L. EVERARD NAPIER, M.R.C.P. (Lond.)
School of Tropical Medicine, Calcutta

Two plates illustrating the aldehyde (Napier, 1921) and the antimony (Chopra, Gupta and David, 1927) tests were prepared at the request of a senior administrative officer in a province where kala-azar is prevalent. This short note on diagnostic methods in kala-azar has been prepared as an introduction to these plates and the accompanying diagnostic tables.

The clinical picture in a well-established case of kala-azar is very characteristic, but in all kala-azar endemic areas there are other conditions that may simulate this disease so that it is seldom justifiable to make a diagnosis solely on the clinical findings. On the other hand, practically all the signs and symptoms of kala-azar may be absent even in a patient who has had the disease for six months or more. Therefore, in every case of suspected kala-azar, or of undiagnosed fever, of splenic enlargement or of

PLATE XXI
Aldehyde (Napier) test



Positive.

Doubtful (+).

Doubtful \pm .

Nega

The technique

Take 5 ccm of blood from a vein with a sterile and dry syringe, and allow it to stand until the serum separates.

Place 1 ccm. of clear serum in a test tube, $\frac{1}{2}$ inch by 4 inches, and add one drop of commercial formalin. Mix well by rotating the tube between the hands.

Reading the result

The final result should be read at the end of 24 hours, but with experience a very good idea of the probable result will be obtained in half an hour.

Positive. Solid, white and completely opaque (hard-boiled egg); no light transmitted through the serum (plate XXI, a). If complete opacity is produced in 20 minutes, the result is +++, if in two hours, ++, and if in 24 hours, +.

Doubtful (+). Solid, with milky appearance which looks opaque against a dark background, but shows the shape of the window when held up to the light, after 24 hours (plate XXI, b).

Doubtful \pm . Solid, slightly milky but quite transparent, after 24 hours (plate XXI, c).

Negative (-). Solid but crystal clear, after 24 hours.

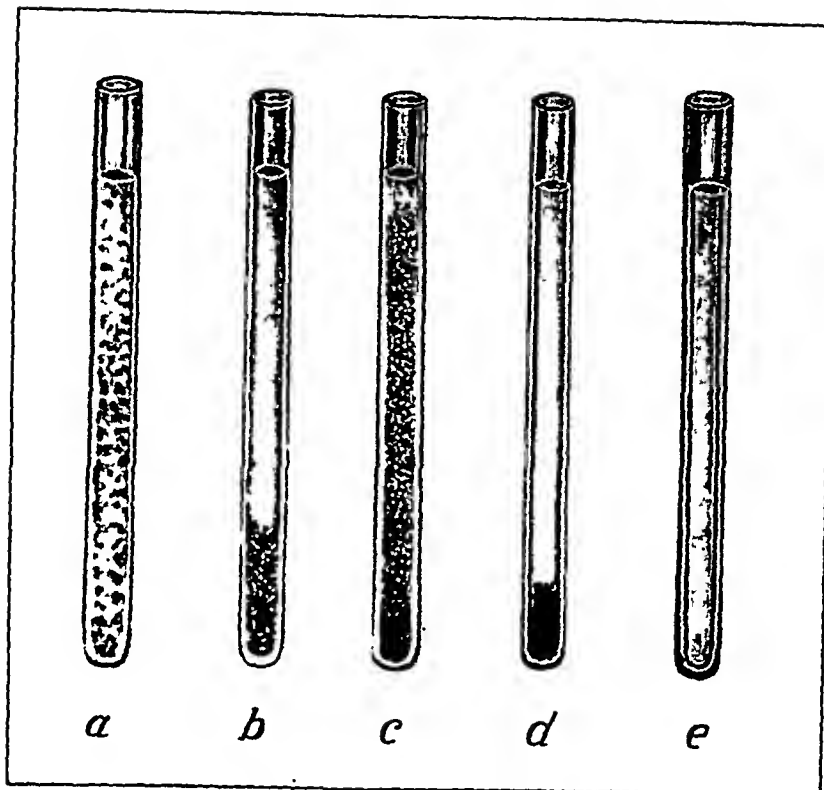
Negative - ive. Serum unchanged (fluid), after 24 hours (plate XXI, d).

Interpretation of results

Size of spleen	Aldehyde test reading	+++, ++, or +.*	(+)	\pm	(-)	- ive
Below the navel	Kala-azar	Doubtful	Not kala-azar.	Not kala-azar.	Not kala-azar.
Four inches or more below costal margin but not below the navel.		Kala-azar	Probably kala-azar.*	Possibly kala-azar.	Probably not kala-azar.	Not kala-azar.
Two inches or more but less than four below costal margin.		Kala-azar	Kala-azar*	Possibly kala-azar.	Probably not kala-azar.	Doubtful
Palpable, but less than two inches below costal margin, or not palpable.		Kala-azar	Kala-azar*	Possibly kala-azar.	Doubtful	Doubtful

* Except when there are obvious signs of advanced tuberculosis or leprosy.

PLATE XXII
Antimony (Chopra) test



Positive.

Doubtful.

Negative.

The technique

Take 1 c.cm. of blood from a vein with a sterile and dry syringe, and allow it to stand until the serum separates. The serum is diluted ten times with double distilled water in a capillary pipette with a rubber teat and is put into a miniature test tube, $2\frac{1}{2}$ inches to 3 inches long with an internal diameter of 3 to 4 mm. A 4 per cent solution of urea-stibamine in double distilled water is then slowly run down the inside of the tube from a clean capillary pipette.

Reading the result

Positive. This is indicated by a heavy flocculent precipitate forming almost immediately (plate XXII, a); this settles as a flocculent mass in the course of half an hour or so (plate XXII, b).

Doubtful. This is indicated by a fine granular precipitate which settles more slowly (plate XXII, c), but forms a more compact mass at the bottom of the tube (plate XXII, d).

Negative. In a negative result no precipitate occurs (plate XXII, e).

Interpretation of results

Antimony test reading. Size of spleen	Positive	Doubtful	Negative
Below the navel ..	Doubtful	Not kala-azar.	Not kala-azar.
Four inches or more below costal margin but not below the navel.	Probably kala-azar.	Doubtful	Not kala-azar.
Two inches or more but less than four below costal margin.	Kala-azar*	Doubtful	Probably not kala-azar.
Palpable, but less than two inches below costal margin, or not palpable.	Kala-azar*	Doubtful	Doubtful

* Except when there are obvious signs of advanced tuberculosis or leprosy.

unexplained continued ill health, in a kala-azar endemic area, one or more of the simple serum tests for this disease should be carried out, even if one of the methods of demonstrating the presence of the causative organism is not adopted.

Methods of demonstrating the presence of the parasite

Examination of the peripheral blood for parasites is a simple method that should not be neglected. If four films are taken and made in such a way that most of the white cells are drawn to the end of the film to form a 'leucocytic' edge, as described by Wright for the opsonic index technique, this edge can be rapidly examined. By examining four such films, which will take only about 20 minutes, parasites can be found in 60 per cent of cases of kala-azar.

Other methods of demonstrating the parasite are sternal puncture and spleen puncture.

Sternal and spleen punctures.—We do not propose to describe the technique of either of these methods; for this, reference may be made to two recent papers in this journal (Napier, 1936, and Napier and Sen Gupta, 1938).

For the last three years we have been doing sternal puncture as a routine examination in all forms of anæmia. In a certain number of cases of anæmia due to kala-azar we found leishmania in the smears made from the sternal fluid; we reported this in the *Annual Report of the Calcutta School of Tropical Medicine* for 1937. During the last 18 months we have adopted sternal puncture as a routine examination in kala-azar, only doing spleen puncture in those cases in which there was a negative finding by the former method.

Our findings to date can be summarized as follows:—

Untreated kala-azar

Leishmania found in sternal puncture material	51
Leishmania not found in sternal puncture but found in spleen puncture material	15
Leishmania not found in smears from either spleen or sternum, but grown in culture from spleen puncture material	2
	68

The positive sternal puncture findings are thus 75 per cent.

If we exclude the first 27 cases, reported in our 1937 annual report, on the grounds that in all these early cases the films were not searched specifically for leishmania, the numbers are reduced to:—

Leishmania found in sternal puncture	33
Leishmania not found in sternal puncture	8

The positive findings in this series are 80.5 per cent. The present writer (1923) found leishmania in 90.8 per cent of first spleen punctures.

Thus, even if one takes the more favourable figures, the sternal puncture findings are considerably inferior to the spleen puncture findings. In the average spleen puncture there are parasites in large numbers in every field, but in a

sternal puncture smear, even when parasites are present, a search has often to be made before they are found. It is important to emphasize this, as recently there has been a tendency in the literature to suggest that sternal puncture can now replace spleen puncture entirely (Chung, 1938; Schretzenmayr and Lancaster, 1938).

The advantages of sternal over spleen puncture are that it is probably safer in inexperienced hands, though the writer claims over six thousand spleen punctures without any untoward results, and that it can also be done in early cases in which the spleen is not palpable.

Cultural methods.—These will only be possible when the services of a well-equipped laboratory are available. Cultures of the peripheral blood will be 'positive' in every untreated case of kala-azar, if the technique is faultless, but it may be three weeks or even a month before there is any sign of growth in the medium. Cultures can also be made from the spleen puncture or sternal puncture material, and in both these instances an earlier positive finding may be expected.

The limitation of the serum tests

The changes in the blood which are demonstrated by the serum tests take place slowly. The antimony test is the more delicate test and therefore signs of these changes will appear earlier; on the other hand, in all cases of splenomegaly the antimony test is liable to give equivocal results, and, in some cases of marked splenomegaly in which kala-azar can be excluded, it will give a positive result. The approximate times of development of the two reactions are shown in the table below: in the second column the approximate sizes of the spleen at different stages of kala-azar are given. Histories are notoriously inaccurate in this

TABLE

Duration of symptoms	Probable size of the spleen below costal margin	Aldehyde test	Antimony test
Less than 1 month	0	—ive	—ive
One month ..	Palpable	—ive	±
Two months ..	1 inch	(—) or ±	±
Three " ..	2 inches	± or (+)	± or +
Four " ..	3 "	(+)	+
Five " ..	4 "	+	+
Six " ..	5 "	+ or ++	+
Over six months	6 "	++ or +++	+

disease, as the patient often finds it difficult to state when he first became ill, and therefore the size of the spleen is usually a better indication of the duration of the disease than the history itself. For the interpretation of the results of the serum tests we have therefore used the size of the spleen as one of the criteria.

Advanced tuberculosis and leprosy are mentioned as likely to give rise to confusing, though seldom definitely positive, results.

Schistosomiasis and typanosomiasis, which do not occur in the kala-azar endemic areas in India, may also give confusing results with the serum tests.

Notes on the interpretation of results.—By means of the aldehyde test, in the small-spleen cases, where the infection may be recent and the serum changes not fully developed, it is not possible to make a negative diagnosis, but if the spleen is large one may assume that, had this enlargement been due to kala-azar, the serum changes would be fully developed and the test positive; if it is not positive then there is some other cause for the splenic enlargement and a negative diagnosis may be made. Theoretically, it might be possible for a patient with an already enlarged spleen to contract kala-azar, but in actual experience this appears to occur very seldom.

In the tables of the interpretation of results, where the diagnosis is given definitely as 'kala-azar' or 'not kala-azar', this means that, in an endemic area such as Calcutta, the chances are about 100 to 1 that this diagnosis is correct.

With the antimony test a positive diagnosis can often be made at an earlier date (see table, page 601), but where the spleen is markedly enlarged a positive diagnosis cannot be made with safety and the aldehyde test should be done. That is to say, both tests should be done in all but the very early case, where little help will be obtained from the aldehyde test.

When a doubtful result is given by these tests, one of the methods of demonstrating the parasite (see above) should be adopted, or the patient marked as 'pending' and, if other diseases are excluded, a full course of cinchona febrifuge given. In the early case, there is little disadvantage in delaying the diagnosis as the 'positive-aldehyde' case reacts better to treatment than the 'negative-aldehyde', or early, case. In no circumstances should a few doses of antimony be given as a therapeutic test, but, if in a 'probable' case it is decided to undertake treatment for kala-azar, a full course of treatment should be given and a failure of response to the first few injections should not be considered an indication for discontinuing treatment. Once treatment is commenced diagnosis is made more difficult.

If in a 'pending' case there is no advance in serum reactions in a month's time, the case is probably not kala-azar.

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THROMBOCYTOSIS AND SPLEEN EXTRACTS

By C. R. DAS GUPTA, M.B. (Cal.), D.T.M.
 and

L. EVERARD NAPIER, M.R.C.P. (Lond.)
 School of Tropical Medicine, Calcutta

S. M., son of a cultivator, aged about 10 years, was admitted to the Carmichael Hospital for Tropical Diseases for the treatment of microcytic hypochromic anæmia. The boy had not been well for the last two years and was gradually becoming weaker and weaker. He also gave a history of occasional diarrhoea.

On examination he was found to be thin and rather tall for his age. The spleen and liver were not enlarged, no abnormality was found in any of the organs, and there was no manifestation of any involvement of the nervous system.

Laboratory findings

Blood.—This showed a moderate degree of microcytic hypochromic type of anæmia with a very high platelet count—2,187,000 per c.mm. of blood (see table for details of counts, and chart).

Coagulation time, bleeding time and the fragility of the red cells were all within normal limits.

Sternum puncture.—There was a slightly normoblastic reaction, but the marrow did not show any great excess of megakaryocytes.

Fractional gastric analysis.—The acidity was within normal limits and the peptic digestion was complete.

Stools.—Hookworm ova, 300 ova per gramme of stool.

Treatment.—The boy was given ferrous sulphate tablets, grains six, twice daily after food for 21 days—the routine hospital treatment for microcytic hypochromic anæmia. There was some improvement in the blood picture but the platelets continued to be at the higher level.

He was then given two courses of carbon tetrachlorethylene at an interval of seven days, after which the blood picture came down to the original low level and the platelets continued to be high.

The failure of the iron treatment together with the persistent high platelet count led us to think that this was not a simple case of iron-deficiency anæmia, but that some other factor or factors were responsible for this anomalous combination of anæmia and thrombocytosis.

The patient was now put on spleen substance, 5 c.cm. each week intramuscularly for 5 weeks on the assumption that, as the removal of the spleen causes an increase in the circulating

(Continued from previous column)

- Napier, L. E. (1936). *Lancet*, ii, p. 125.
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thrombocytes in many cases of essential thrombocytopænia, conversely administration of this tissue might lead to a reduction in the number of platelets in the peripheral circulation, as was observed by Troland and Lee (1938) in animals after administration of splenic extracts from patients with essential thrombocytopænia.

This treatment was associated with a reduction in the number of circulating platelets from 2,187,500 to 401,400 per c.mm. in a period of 5 weeks, though the blood picture still continued at a low level. However, a second course of ferrous sulphate—gr. 12 each day for 21 days—now brought up the blood almost to the normal level—the blood platelets remaining within normal limits. The patient was kept under observation for another three weeks, during which time the blood picture and the platelets remained at the normal level.

There are two hypotheses—
(i) A hyperfunction of the spleen which leads to over-destruction of platelets with a consequent reduction in the number of platelets in the blood (Kaznelson, 1916). The effect of splenectomy in correcting the disorder in these cases is explained as due to the removal of the culprit organ.

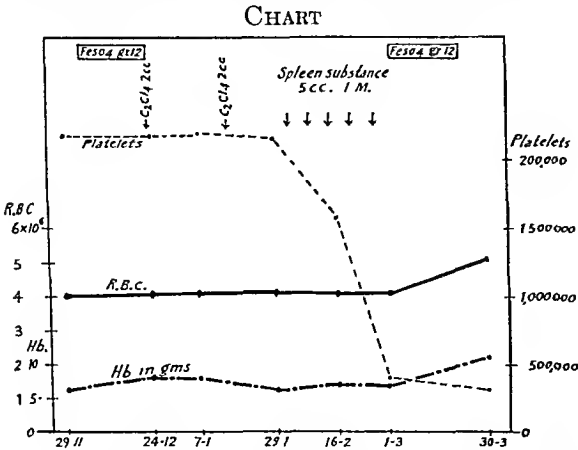
(ii) A primary megakaryocyte deficiency which is due to the depressant action of the spleen on the marrow (Frank, 1915). The removal of the spleen means the withdrawal of the depressant action; the marrow then functions normally producing and sending to the circulation the requisite number of platelets.

This latter hypothesis seems to be more reasonable as hæmolysis and thrombocytolysis, as functions of the spleen, are dependent on theories which are not tenable on the basis of our present-day knowledge. The most powerful

TABLE
Showing blood findings at various stages

Date	Treatment and diet	Hæmo-globin in grammes per 100 c.cm.	Red blood cells in millions per c.mm.	Reticulo-cytes, per cent	Cell volume, per cent	Mean corpus-cular volume in cu μ	Mean corpus-cular hæmo-globin $\gamma\gamma$	Mean corpus-cular hæmo-globin concentration per cent	White blood corpus-cles per c.mm.	Platelets per c.mm.
29-11-37	On admission ..	6.2	4.05	0.8	26.6	65.7	15.3	23.3	9,250	2,187,000
24-12-37	After first course iron.	8.39	4.38	1.2	33.2	76.5	19.3	25.3	13,000	2,208,000
29-1-38	Before spleen sub-stance.	6.5	4.60	2.1	29.5	63.9	14.4	21.9	11,900	2,180,000
1-3-38	After spleen sub-stance.	7.01	4.46	2.8	28.3	63.4	15.7	24.8	..	401,400
30-3-38	After second course iron.	11.0	5.32	0.4	40.5	74.2	20.2	27.1	10,150	308,560

Discussion.—Of the various functions attributed to the spleen, regulation of the thrombocytes is undoubtedly one, as is illustrated by



the beneficial effect of splenectomy often seen in suitable cases of essential thrombocytopænia (Spence, 1928). But how this is brought about has not been conclusively proven.

argument against an active splenic hæmolysis is the blood crisis invariably seen after splenectomy. The crisis occurs within a few hours of the operation with a profuse shower of nucleated erythrocytes in the peripheral circulation as if the regulating mechanism of erythropoiesis was thrown out of gear by removal of the spleen. The blood crisis seen after splenectomy cannot be explained as being due to the removal of a hyper-hæmolyzing organ taxing the bone marrow, as the effect in such a case would have been a slow and gradual recovery of the marrow and disappearance of all the pathologic cells from the circulation. As it stands, the crisis is only explicable as due to an inter-relationship between the spleen and the marrow. But this inter-relationship between the spleen and the marrow is not clearly understood as the action of the spleen on the marrow is not always the same—sometimes the spleen stimulates, while at other times it inhibits the action of the bone marrow.

TRANSPLANTATION OF URETERS FOR INOPERABLE VESICOVAGINAL FISTULA

A REPORT OF TWO CASES

By HERSCHEL C. ALDRICH, B.A.,
M.D. (Ohio State Univ., U. S. A.)

American Methodist Mission Hospital, Nadiad

COFFEY (1911) and Stiles (1911) described somewhat similar techniques for the transplantation of ureters. Operations for transplantation previous to this date, suggested by various surgeons, were not satisfactory, and resulted in a high mortality rate. Coffey modified his first technique, designating it as Coffey II (1927), and Coffey III (1931). It is not until quite recently that more than a few cases have been operated on successfully for the transplantation of ureters to the rectum. Turner (1929) reported 17 cases by the Stiles' technique. Woodman (1936) reported a series of cases also by the Stiles' technique. Orr (1937) reported a series of 13 cases (5 cases by Coffey II, 1 case by Coffey III, high transplantation 1 case, and 6 cases by the Stiles' technique). In this series of 13 cases, the 5 cases done by the Stiles' technique were entirely successful, whereas those done by the other methods were unsatisfactory for various reasons.

Essentials for a successful transplantation are :—

(1) The anal sphincter must be undamaged and in good condition, in order that the urine may be retained in the rectum without leaking.

(2) The ureters must be transplanted one at a time, with a sufficient interval between the two operations to permit the first kidney to recover from the temporary incapacity accompanying the pyelo-nephritis that invariably sets in immediately following the implantation of the ureter into the septic rectal field.

(Continued from previous page)

Morawitz tries to explain this seemingly anomalous function of the spleen as a 'conditioned' function of the spleen. In the case cited above, the 'conditioned' action of the spleen is well illustrated. The patient had anæmia with thrombocytosis denoting inhibition of erythropoietic function with stimulation of the megakaryopoietic function. The administration of spleen substance effected an immediate correction in the thrombocyte formation and paved the way for the correction of the anæmia with iron, which had not responded previously to the same dose of iron.

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(3) The distal $2\frac{1}{2}$ inches or 3 inches of the transplanted ureter must have some suitable drain placed within its lumen to prevent a complete destruction of kidney function from a blockage of the lumen, which might occur if this were not done, because of the rather sharp reaction, with oedema, that must occur from this sepsis.

Vesicovaginal fistula is a very common condition in India; where, as a rule, most cases are delivered in their homes by untrained *dais*. Many of these cases of vesicovaginal fistula are totally beyond repair surgically, as frequently the whole bladder trigone, together with the sphincter and a portion of the urethra are completely torn out. In such cases the transplantation of the ureters to the rectum or sigmoid, preferably by the Stiles' technique, is to be strongly recommended. Where this is not done, the woman is outcaste by her husband and friends. She is put to no end of discomfort from the excoriation and irritation of skin, and the foul smell, which are a part of the continuously dripping urine. Following a successful transplantation, the woman is completely freed from this inconvenience, and can live a normal life, once again taking her place in the family.

We are reporting the two following cases operated on by the Stiles' technique; four separate operations in all. Both these women are very pleased with the outcome of the operation. One of them has now been at home for a period of about a year and a half; the other has recently been discharged from the hospital.

Case 1.—Female, 17 years of age, Hindu, Patel by caste. This woman first presented herself at our hospital on 24th June, 1937, with the history of having had a forceps delivery in another hospital some three months ago; following this there was a continuous dripping of urine, and a partial paralysis of both legs. Patient could only walk with the greatest of difficulty. This was her first pregnancy, and the child was delivered at term.

On examination the patient was found to have a rather markedly contracted pelvis. Vaginal examination:—The entire base of the bladder, together with the sphincter, urethra, and lower portion of the triangular ligament completely torn out. The anal sphincter was found to be in good condition, with normal control. This patient was operated on on 30th August, at which time the right ureter was transplanted into the rectum by the Stiles' technique.

Following this operation, for 7 days there was an irregular temperature ranging from a 104°F. to normal. The temperature on the 8th day was normal, and remained so until the second operation on the 16th of September (transplantation of left ureter and ligation of tubes to prevent further pregnancies). Following this second operation, there was a rise of temperature to 101.8°F. on the second day, and an irregular low fever ranging between normal and 99°F. , for a period of some five days, following which it was again normal. After each operation, there was a rather marked decrease in the output of urine from the kidney on the side operated upon, during the first 48 hours, which however, soon returned to normal after this interval.

This patient was discharged on the 29th of September, 1937, with full control of the urine per rectum, and with no complaints.

We have since heard from this patient on two different occasions. We saw her personally six months after the operation at which time she came to the hospital bringing another patient. She was so well satisfied with the result of the previous operation, having no complaints, that she had nothing to say concerning her own case until we inquired from her as to how she was getting along. We again heard from this patient through her husband over a year after the operation, and he reported that she was well and happy with no complaints.

Case 2.—Female, aged 25, Patel by caste. This patient presented herself at our hospital on 26th April, 1938, with a history of having incontinence of urine, following the birth of the last child 12 months ago. She had had six previous uncomplicated pregnancies with three children living. On examination, the entire base of the bladder, together with the sphincter, and a portion of the urethra, were found completely torn away, and there was a continuous dripping of urine through the vagina. The cervix was found to be somewhat soft, and there was a moderate purulent discharge. The patient was scheduled for operation on 2nd May, 1938, at which time the abdomen was opened, and the uterus was found to have the appearance of about a two months' pregnancy. Under the circumstances, we did not feel justified in proceeding with our proposed uterine transplantation, and so the abdomen was closed. The patient was discharged on 18th May, and instructed to return after the delivery of the child. This she did about one year later, 10th April, 1939, with the history of having delivered a baby at term, which died shortly after birth. The right ureter was transplanted to the rectum by Stiles' technique on 14th April, and at this time both tubes were ligated to prevent future pregnancy. The reaction following this operation was very similar to that of the first case reported. There was an irregular temperature ranging from 102°F. to 99°F. for the first week post-operative. The left ureter was transplanted 22 days after the first operation, 5th May. Following this operation the patient had a rise in temperature to 100°F. for one day only, after which there was a slight irregular fever for about a week. The output of urine was as in the first case; that is, much diminished the first 48 hours from the side transplanted. The patient was discharged on 26th May with full control of the urine per rectum, and with no complaints, fully satisfied with the results.

In both these cases it will be noted that there was a rather sharp reaction following the first transplantation and only a comparatively slight reaction following the second. We are considering in the future the use of an autogenous vaccine of *B. coli* made from a culture obtained from the rectum pre-operatively. This might well be done during the week's pre-operative preparation which is routinely followed in the Stiles' technique.

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WHAT MAY WE EXPECT FROM THE SUBTOTAL HYSTERECTOMY ?

By L. M. SZAMEK, M.D. (Vienna)

Calcutta

(Former Director of the Frauenkrankeninstitut, Charité in Vienna)

THE question, whether subtotal hysterectomy should be regarded as a recognized method of treatment in cases of uterine lesions has not been decided yet.

Weibel (1939) brought this topic before the Gynaecological Society of Vienna in 1924 and his conclusions were that this operation should be eliminated entirely because of its many disadvantages and replaced by total hysterectomy. This should be the operation of choice every time, when the uterus has to be removed by the abdominal route.

Actually, it should be obvious at first sight that complete removal of an organ may indicate more surgical judgment than a partial one, and that a stump left behind may have troublesome sequels, particularly the later development of a carcinoma.

Therefore, we are not at all surprised that many clinicians have completely discarded subtotal hysterectomy as a worthless operation. But reviewing the literature we find on the other hand that this operation is by no means unanimously condemned.

Almost all the Vienna gynaecologists took part in the general discussion, which followed Weibel's lecture. I myself (1924) had the opportunity of expressing an opinion derived from experiences of 268 cases at Latzko's Clinic in Vienna. Summarizing these, I felt authorized to intercede for the maintenance of subtotal hysterectomy because I was in a position to explain the reasons for our having obtained good results by this procedure. I also called special attention to the factors which had brought this operation into discredit; these factors persist to this day and are due to loose indications.

Subtotal hysterectomy should be reserved for absolutely clean cases, i.e., cases without any sign of inflammation either in the intra-peritoneal parts of the sexual apparatus or of the cervix.

The group of cases in which subtotal hysterectomy is definitely indicated would include conditions such as following: fibroid disease of the uterus, indefinite bleedings such as can be grouped under the term 'metropathia hæmorrhagica', particularly when this condition occurs in relatively young women. To this we would

(Continued from previous column)

Turner, G. G. (1929). *Brit. Journ. Surg.*, Vol. XVII, p. 114.

Woodman, G. S. (1936). *Lancet*, i, p. 1112.

[Note.—Attention is also drawn to a paper by Lieutenant-Colonel V. B. Green-Armytage in *The Indian Medical Gazette* in 1932 (Vol. LXVII, p. 631).—EDITOR, I. M. G.]

TABLE I
Results of treatment

Number	Sex	Age	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
			Date	Dose	Result	Date	Dose	Result	Date	Dose	Result	Date	Dose	Result
1	M.	13	25/6	30	+	2/7	30	+	..	..	..	..	..	..
2	F.	10	2/7	30	-	No drug	..	+	..	..	..	..	..	..
3	F.	33	21/6	60	-	No drug	..	-	..	..	..	..	..	..
4	F.	10	23/6	30	+	..	..	..	..	..	..	..	..	..
5	F.	14	28/6	30	+	8/7	30	+	..	..	..	..	..	..
6	M.	6	12/7	22½	-	No drug	..	-	..	..	..	..	..	..
7	F.	11	9/9	30	+	19/9	30	-	..	..	..	..	..	..
8	M.	16	25/8	60	-	..	..	..	..	..	..	..	..	..
9	F.	10	27/8	30	+	3/9	30	+	15/9	30	+	22/9	30	+
10	F.	7	9/9	30	+	19/9	30	+	29/9	30	+	13/10	30	..
11	M.	27	1/9	60	+	8/9	60	+	19/9	60	..	..	..	..
12	M.	12	13/9	30	+	22/9	30	+	..	..	..	..	..	..
13	M.	26	6/9	60	+	13/9	60	+	21/9	60	+	3/10	60	+
14	M.	35	13/9	60	+	22/9	60	+	13/10	60	+	20/10	60	+
15	F.	30	26/9	60	+	13/10	60	..	..	..	..	..	..	..
16	M.	42	17/9	60	+	24/9	60	..	..	..	..	..	..	..
17	M.	36	20/9	60	+	3/10	60	+	11/10	60	+	4/11	60	..
18	F.	10	27/9	30	-	..	..	..	..	..	..	..	..	..
19	M.	20	17/10	60	+	..	..	..	..	..	..	..	..	..
20	F.	25	28/11	60	+	5/12	60	+	13/12	60	+	20/12	60	+
21	F.	5	20/10	22½	+	4/11	22½	+	21/11	22½	+	5/12	22½	+
22	M.	20	21/10	60	+	3/11	60	+	..	..	..	..	..	..
23	F.	5	8/11	15	+	..	..	..	..	..	..	..	..	..
24	F.	2	19/12	11	+	..	..	..	..	..	..	..	..	..
25	M.	8	3/2	22	+	10/2	22	+	..	..	..	..	..	..
26	F.	12	3/2	30	+	..	..	..	..	..	..	..	..	..
27	F.	10	14/2	30	+	21/2	30	-	..	..	..	..	..	..
28	M.	30	6/3	60	+	16/3	60	+	27/3	60	+	..	..	..
29	M.	5	7/3	15	+	17/3	15	+	..	..	..	..	..	..
30	M.	9	16/3	22	+	28/3	15	+	..	..	..	..	..	..
31	F.	36	3/4	60	+	12/4	60	-	..	..	..	..	..	..

Note.—The figure in the 'dose' column is the number of grains per day.

Dates are shown as day and month.

Cessation of entries means the particular case was not seen again.

for seven days, and all were passing trichuris eggs a few days later.

Eleven persons, all adults, received four grains of ferrous ammonium sulphate three times a day for seven days and three of them had a repetition of the treatment for a second week. In none of them could any effect on trichuris be observed.

Two adults and one child aged three years were given three, six and two grains respectively, of ferrous sulphate three times a day for three weeks and they passed trichuris eggs throughout the treatment and afterwards.

Discussion

The fact that in our series five cases were negative after one week of treatment is of no significance that iron had any effect on trichuris, because in a series of examinations which were carried out for another purpose some time ago, it was found that 14 out of 40 persons that were positive at the first examination were negative one month later. This particular investigation was conducted on the same persons for a period of twelve months at monthly intervals and absence of eggs in some cases with their re-appearance at a subsequent examination was

noted every month, so one or two consecutive negative examinations when trichuris eggs are not numerous is not evidence of absence of infection even when the direct centrifugal flotation method is used, as was done in this series of examinations and all the others mentioned in this paper.

It is true that our dosage of iron and ammonium citrate was not quite so large as that employed by Vazquez Pausa, except in the case of the three in-patients who received 90 grains of iron citrate a day, and in these the drug was only administered for seven days instead of the ten to fifteen days recommended by the above worker. But in the out-patients eight had three weeks' treatment and five of them had four weeks' treatment, which is much longer than Vazquez Pausa used. It might also be argued that there is no evidence that the out-patients took their medicine, but it is not likely they did not do so or they would not have troubled to return for more.

The anæmia cases that were treated with ferrous iron are not strictly comparable with those of Vazquez Pausa either, because this form of iron is now used in treating certain forms of anæmia on account of its greater absorbability

than the ferric salts, therefore less would remain in the intestine to come in direct contact with the worms. They have been included, however, because in certain forms of successful treatment claimed for trichuris infection and other intestinal helminths, notably the intravenous injection of oil of chenopodium for trichuris by Lambert (1923), the drugs are supposed to act after absorption and alteration in the body and not directly on the worms in the gut. It might be held that iron acts in this way but these cases do not support that idea.

In the light of our practically negative results it is difficult to understand the high cure rate

Conclusion

It is considered that evidence has been produced that the forms of iron in common use for treatment of certain types of anæmia are of no use in removing trichuris.

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TABLE II

Showing comparison between D. C. F. and Stoll's counts

District	Number examined	Number positive	Percentage positive	Average number eggs per gramme of stool in infected persons	Percentage + D. C. F. and + Stoll	Percentage + D. C. F. and - Stoll	Percentage - D. C. F. and + Stoll
I	1,558	1,465	94.03	1,031	73.65	26.34	*
II	3,199	2,565	80.11	320	47.41 †	51.81	0.77
III	1,990	1,518	76.28	232	38.80 †	61.19	*

* The records did not permit of this information being obtained so in these instances this figure is included in the column '+ D. C. F. and + Stoll'.

† These differences are statistically significant.

claimed by Vazquez Pausa, even admitting that our treatments were not quite so intensive as his. There is no mention in his paper of the method used for egg demonstration in the faeces, so it is possible that it is in this direction that the explanation may lie. Nevertheless, one must assume that he used the same technique of stool examination before treatment as he did afterwards so this should not be the explanation. However, if a crude smear method were employed, diminution in numbers but not total absence of eggs might lead to failure to find them on post-treatment examination, and hence the claim made that cure had been effected. In this connection table II is of interest as it shows the great influence two different methods of egg recovery have in disclosing the number of trichuris infections when the number of eggs varies. These results have been collected from records of survey work done previously in which both D. C. F. and Stoll's dilution counts were done, the one for diagnosis and the other for estimating the severity of the infections found. The counting method was the same as that originally recommended by Stoll (1923), except that twice the amount of diluent was used, because our experience was that this gave higher counts than the dilution he advocated, possibly because 'camouflage' was reduced. The three different sets of figures represent different districts in which trichuris infection was found to vary considerably both in frequency and intensity. One was in the Bengal Dooars, one in the Assam Valley and the other in the Sylhet district of Assam.

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QUALITY OF QUININE PREPARATIONS IN INDIAN HOSPITALS AND DISPENSARIES

By INDU BHUSAN BOSE, Ph.D. (Berlin)
 B. MUKERJI, M.B. (Cal.), M.D., D.Sc. (Mich.)
 and

R. N. CHOPRA, C.I.E., M.A., M.D., Sc.D. (Cantab.),
 F.R.C.P. (Lond.)

BREVET-COLONEL, I.M.S.

(From the Biochemical Standardization Laboratory, Government of India; All-India Institute of Hygiene and Public Health, Calcutta)

Introduction

As early as 1907, Major-General Sir John Megaw, late Director-General of the Indian Medical Service, called attention to the frequency with which patients seeking treatment for malarial fevers in various hospitals and dispensaries failed to receive the doses of quinine which were prescribed for them. Later, Megaw, Ghosh and Chatterjee (1928) conducted an enquiry on the quality and quinine content of nearly 100 stock solutions obtained at random from various hospitals and dispensaries in Bengal and Assam. The results of this survey revealed that no less than 25 per cent of the samples were 25 per cent or more weaker than the stated strength.

The Drugs Enquiry Committee appointed by the Government of India in 1930-31 (Chopra *et al.*, 1931) collected a large number of quinine tablets from the various provinces of India through the co-operation of the witnesses who tendered evidence before the committee, and found on analysing them that a very large percentage were either adulterated or contained comparatively smaller proportions of quinine than that claimed by the manufacturers.

In the course of an all-India survey of the quality of drugs and medicinal chemicals, the Biochemical Standardization Laboratory has, during the last two years, analysed more than 150 samples of quinine and cinchona preparations. The results indicate, in no uncertain terms, that the unsatisfactory state of affairs, which existed 30 years ago in this country with regard to the deficiency in the strength of quinine mixtures and other preparations of similar category and which had been the subject of repeated warnings, still continues with unabated intensity even to this day. If the condition has changed at all, it has changed for the worse. In view of the gravity of the problem, it seems desirable that the medical profession should be aware of the real situation so that they can co-operate, if necessary, in any programme to eradicate the evil. The present paper is published with this idea in view.

Procedure

(a) *Collection of samples.*—Through the courtesy of the heads of medical and public health administrations of the various provinces of British India, a fairly representative collection of quinine preparations of different categories was made. These included stock quinine sulphate mixtures from the various hospitals and dispensaries, quinine sulphate tablets and powders, quinine bihydrochloride tablets, powders and mixtures, and a host of other quinine and cinchona preparations such as ammoniated tincture of quinine, quinine ethyl carbonate, quinine tannate, 'quinetum', cinchona febrifuge, tincture of cinchona, compound tincture of cinchona, etc. The stock solutions of mixtures were received generally in sealed bottles with a label containing a statement regarding the amount of quinine said to be present per ounce of the mixture. The tablets and powders of the quinine salts and other solid preparations of cinchona were obtained generally in sealed paper packets and, sometimes, in original unbroken glass or tin containers. A few brands of quinine tablets were bought by the officers of the laboratory from the open market, while a few others were presented to the laboratory for analysis by certain commercial firms and independent medical practitioners. The names of the manufacturers were obtained in as many cases as possible, but information regarding the dates of purchase, countries of origin, and conditions of storage of the samples were not available in some instances.

(b) *Methods of analysis.*—The analytical methods employed for the determination of purity of the preparations mentioned above are chiefly those described in the *British Pharmacopæia*, 1932. Cinchona febrifuge samples have been assayed according to the details laid down under 'quinetum' in the *British Pharmaceutical Codex* (1934) and also under 'totaquina' in the *British Pharmacopæia*, 1932.

To determine accurately the quinine content of the stock mixtures of quinine, an aliquot portion (about 10 c.cm.) was first made alkaline with ammonia or caustic soda solution and then extracted with chloroform until complete extraction of the alkaloids took place. The chloroform containing the alkaloid in solution was then removed, treated with about 1 to 2 c.cm. of 95 per cent alcohol, and evaporated to dryness at 110°C. till constant weight was obtained. The residue, which represents the quinine base, was weighed and the weight of the corresponding salt calculated from this figure. The cinchona febrifuge mixtures are treated in almost the same manner as the quinine mixtures, the content of total alkaloids being determined, instead of quinine alone, in such cases.

In a large majority of cases, duplicate analyses have been carried out by two chemists working independently. There are a number of instances, however, where this was not possible, owing to insufficient quantities of the specimens being supplied for analysis by the parties concerned.

Results

A summary of the results of analyses of 100 so-called 'quinine mixtures' is presented in table I. The majority of these samples (82 out of 100) are stock mixtures of quinine sulphate, this being the salt of quinine most commonly employed for routine treatment in Indian hospitals and dispensaries. A few cinchona febrifuge mixtures are also included in the series. Out of a total of 100 samples, only 20 stock mixtures (20.0 per cent) are up to standard or are found to agree with the claims made by the senders, on the labels attached to the bottles. Sixty-four samples have shown a deficiency of quinine, of which as many as 23 samples (nearly one-third) are found to contain less than 60 per cent of the stated strength of quinine. Eleven samples contain from *nil* to about 30 per cent of the quinine salt claimed. This is certainly a very disquieting state of affairs, particularly when it is observed that the majority of the samples reported upon in this paper have been received from government or government-controlled hospitals and dispensaries. If samples could be secured at random from private and charitable dispensaries, there is little doubt that a worse state of affairs would be found to exist.

Slight variations in the quinine content of hospital mixtures may well be ignored and may presumably be accounted for by inaccuracy of

dispensing but, when the deficiency goes down to nearly 80 per cent or less of the stated strength, there is strong reason to believe that some fraud is being perpetrated in the compounding room or at the dispensing counter, and the situation demands prompt remedy. When a mixture is found to contain less than 50 per cent of the stated strength of quinine, it is only to be expected that such a mixture will fail to produce curative effects on patients suffering from malaria.

An interesting observation, for which we were not prepared, is the finding that a few quinine sulphate mixtures actually contained a higher percentage of quinine than that stated on the label. Out of 100 quinine and cinchona mixtures referred to in table I, as many as 16 samples were above standard, a not insignificant figure. Two samples in this group have shown as alkaloidal content nearly 1.5 times as much as the stated strength. This is of course not as bad as a frank deficiency of quinine, but, nevertheless, proves gross neglect and inaccuracy in the dispensing service.

The analytical results of 40 quinine tablets are summarized in table II. Unfortunately details regarding the countries of origin of all the different brands could not be obtained. It may however be stated from the records of 22 tablets at our disposal that they represented samples of Indian, Javanese and European manufacture. Twenty samples (50 per cent)

revealed a distinct deficiency of their quinine contents. Of the 'below-strength' tablets, 9 brands (nearly one-third) showed less than 60 per cent of the stated strength of quinine. One sample contained as low as 6.6 per cent of quinine, and another brand contained no quinine whatsoever. A redeeming feature of this dismal picture, however, is that quite a number of brands contained nearly 90 per cent of the stated strength of quinine. A slight diminution of the strength of quinine of this type, though not desirable on ethical grounds, is not of any serious significance from the therapeutic viewpoint.

To determine whether the quinine sulphate, quinine bishydrochloride, and cinchona febrifuge powders, available in the market or supplied to hospitals or dispensaries for preparing stock solutions for daily prescription service, are of standard strength and proper quality, 28 samples were subjected to analysis, both for the content of active principles and for the presence of any adulterants in them. In table III, the origin, the sources from which the samples were obtained, and the analytical findings of 13 specimens found to be below standard are presented. Though the data in this group are meagre, there is sufficient evidence to indicate that at least some quinine salts and preparations sold in the market are below standard. Most of these samples contained as adulterants, inorganic salts and other cinchona alkaloids. Five

TABLE I

Quantity of alkaloids in 100 samples of quinine and cinchona mixtures

Alkaloid present per cent of claim	Below standard (64)					Approximately correct (20)	Above standard (16)			
	<i>Nil</i>	0-30	30-60	60-80	80-95	95-105	105-120	120-140	150-160	180-190
Number of samples	2	11	12	16	23	20	7	7	1	1

TABLE II

Quinine tablets, their country of origin and analytical results

Total number of samples assayed—40 (Indian 10, foreign 12, unknown 18); up to the standard claimed—20 (50 per cent); below standard—20 (50 per cent).

Country of origin of below standard samples			Quantity of alkaloid in per cent of the claim in below standard samples			
Indian	Foreign	Unknown	<i>Nil</i>	0-40	40-60	80-96
5	6	9	1	3	5	11
25 per cent	30 per cent	45 per cent	5 per cent	15 per cent	25 per cent	55 per cent

TABLE III

Quinine salts and cinchona febrifuge, their country of origin and analytical results

Total number of samples assayed—28 (Indian 16, foreign 10, and unknown 2); up to the standard claimed—15 (53.57 per cent); below standard—13 (46.43 per cent).

Name	Total	Indian	Foreign	Result
Quinine sulphate ..	5	3	2	Inorganic salts and other cinchona alkaloids present.
Quinine bihydrochloride ..	1	1	..	Anhydrous quinine 79.69 per cent.
Cinchona febrifuge ..	5	4	1	Crystallizable alkaloids { 3.3 per cent—1. 45–65 per cent—4.
Quinctum ..	1	1	..	Quinine and cinchonidine 47 per cent.
'Ionized quinine' ..	1	1	..	Quinine trace, Sb, Al and Mg salts present.
Total below strength ..	13	10	3	

samples of cinchona febrifuge (including 'quinctum') gave from 45 to 65 per cent of crystallizable alkaloids. As no definite standards have been fixed for cinchona febrifuge, it is difficult to make any comment on the wide variations that are often noticed from sample to sample. However, as the B. P. 1932 has fixed a definite standard for 'totaquina' (70 per cent crystallizable alkaloids), it seems desirable that all samples of cinchona febrifuge should contain at least 70 per cent of total alkaloids to ensure uniform therapeutic results. Judging from this standard, the cinchona febrifuge samples tested in this laboratory are definitely below par in quality. A sample of foreign origin, contained as low as 3.30 per cent of crystallizable alkaloids, which is the lowest figure on our record. Such a sample is obviously useless and it is surprising how such worthless preparations gain entry into India.

A proprietary preparation called 'ionized quinine' was tested and it was found to contain only a trace of quinine along with certain inorganic metals and salts. It is not known whether a combination of this type can be of any therapeutic utility but certainly the name leads the public to believe that the preparation contains at least a certain amount of quinine. The negligible trace of quinine found in it cannot be expected to do any good in malarial fevers for which the drug is meant to be used. Such preparations are likely to create a false sense of security in the minds of the consumers, and in the interests of the public their sale should be prohibited.

Comment

Medical officers attached to Government or public hospitals in the mofussil areas have repeatedly complained that quinine mixtures and tablets have failed to bring under control cases of malaria under their care. Cases of malaria which are 'quinine resistant' are also

reported from time to time. Clinical reports of this type have often led to a lack of faith in the efficacy of quinine as an anti-malarial remedy. In view of the findings presented above, it seems likely that many fallacies in the field of quinine treatment of malaria may be explained by the fact that quinine administration in proper dosage was not possible in a large percentage of cases, because of the distribution in the hospitals and dispensaries in this country of under-strength quinine mixtures, and of the sale in the Indian market of quinine tablets and quinine salts of inferior quality.

It must be remembered that there are two variables in clinical therapeutics—the *patient* and the *drug*. When a particular remedy fails to bring about an expected cure or alleviation of symptoms, medical men are prone to look for the cause in the *patient* and try to explain the atypical findings, on the basis of the 'susceptibility', 'tolerance' or 'idiosyncrasy', etc., of the individual. The blame is seldom cast on the *drug*, as it is naturally believed to be of standardized quality. This view-point apparently needs revision. Quinine still remains one of the best curative agents in malaria and cases of chronic malaria which have been described as 'quinine resistant' must be very rare, if they exist at all.

Quinine is acknowledged to be one of the most important of all drugs for the malaria-stricken masses of India. The sale of poor quality quinine preparations in India or any tampering with the quality or strength of quinine prescriptions that may take place in the hospitals and dispensaries, therefore, constitutes one of the most cruel forms of injury to the public.

The question that naturally arises in this connection is—'Is there any remedy for such a state of affairs?' Sir John Megaw thought that one of the reasons for the finding of stock solutions of quinine under stated strength in dispensaries might be the fraudulent misappropriation

of quinine by those responsible for the compounding and dispensing of mixtures. Inaccurate dispensing and carelessness on the part of compounders appear also to be important factors, as in a few specimens quantities larger than the stated strength were also found to be present. A suggestion that has been made in the past is that medical men in charge of hospitals and dispensaries should institute a periodic checking of the quality of the stock mixtures of quinine without any previous notice to the dispensary staff. Megaw, Ghosh and Chatterjee (1928) described a simple, roughly quantitative method of determining the amount of quinine in quinine mixtures which does not require elaborate laboratory equipment and which can be carried out in most of the smaller dispensaries and hospitals.

We are not aware of many hospitals and dispensaries where such checking is carried out regularly and zealously. The truth is that medical men in charge of hospitals and out-patients' departments can seldom spare enough time to attend to analytical work and to the checking of dispensary stock and mixtures prepared therein, in addition to their heavy routine duties. Even if some medical officers are enthusiastic enough, they cannot be of much service in appraising the quality of pharmaceuticals and galenicals in general, as expert chemical and pharmacological knowledge are necessary to carry out drug analysis and assay.

The only way by which this state of affairs can be remedied is to institute some form of state control by which regular periodic checking and standardization of drugs, both from hospitals and dispensaries and from the market, may be carried on in special provincial or central government laboratories, specifically set up for the purpose and manned by expert analysts who will be competent to undertake the testing of all kinds of drugs in common use in clinical practice. It seems also imperative that the profession of pharmacy in India be placed on a better footing so that the 'compounders' who compound, dispense, or otherwise distribute drugs are given such training and status as to enable them to discharge in a more able and trustworthy manner the duties and responsibilities attached to their calling. Medicine and pharmacy are intimately related to each other and one cannot make any headway without the other progressing also. The profession of pharmacy is very poorly developed in this country compared to nearly all other civilized countries in the world. Unless this aspect of the problem is dealt with, all sorts of trickery and fraud and inaccuracies in compounding and dispensing service will continue. Definite measures are urgently called for.

Summary

One hundred samples of so-called 'quinine mixture' (including cinchona mixtures), forty samples of quinine tablets, and twenty-eight

specimens of quinine salts and cinchona febrifuge powders, obtained from the various provincial hospitals and dispensaries through the courtesy of the surgeons-general, inspectors-general and the directors of public health were analysed for their purity and quinine (or total alkaloids) content, according to the methods and standards laid down in the *B. P.* 1932, the *B. P. C.* 1934, and other recognized books of reference.

Eighty 'quinine mixtures' were found not to conform to the standards claimed for them. Sixty-four samples (64 per cent) showed a deficiency of quinine. Curiously enough, as many as sixteen mixtures were found to contain a higher percentage of quinine than expected.

Forty samples of quinine tablets, representing several different brands of Indian, Javanese and European make, were tested and in this group also, 50 per cent samples showed a deficiency of quinine content.

Out of twenty-eight samples of quinine sulphate, cinchona febrifuge powders and other miscellaneous solid preparations of this category, thirteen specimens were found to be below standard. Quinine sulphate powders gave tests for the presence of inorganic salts and other cinchona alkaloids indicating the presence of adulterants in them. Cinchona febrifuge specimens were found to contain a considerably lower percentage of the crystallizable alkaloids than that laid down for 'totaquina' in the *B. P.* 1932.

This survey clearly reveals the unsatisfactory state of affairs that exists in this country regarding the importation, sale, and distribution of an essential remedy for malaria, one which is of paramount importance to the malaria-stricken masses of India. It is pointed out that effective control from this kind of fraud in the drug trade and dispensing service can only be exercised by the creation of a state organization for the analysis and standardization of drugs, and also by the improvement of the profession of pharmacy which is at present in a very backward state in India. In view of the gravity of the problem, it seems desirable to institute definite measures to safeguard public health as early as possible.

Acknowledgment

The completion of such an extensive survey is naturally not possible without the co-operation and team work of a number of workers. It is our pleasant duty to acknowledge the help rendered in this work by Mr. R. C. Guha, M.Sc., Mr. K. B. Sehra, M.Sc., and Mr. B. K. Ghosh, M.Sc., our assistant chemists.

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AGES OF EPIPHYSIAL UNION AT THE ELBOW AND WRIST JOINTS AMONGST INDIAN GIRLS*

By RAI BAHADUR RAGHUNANDAN LALL, M.B.
Head of Department of Radiology, King George's
Hospital, Lucknow

and

R. S. TOWNSEND, M.C., M.D., M.C.O.G.
COLONEL, I.M.S.

Inspector-General of Civil Hospitals, North-West
Frontier Province, Formerly Reader in Forensic
Medicine, Lucknow University

THE work on which this report is based was carried out by the first writer in the radiological department of King George's Medical College,

It is difficult to define in a skiagram the point at which union may be said to be complete, but for our purpose an epiphysis was considered as definitely united only if the epiphysal space was, in bony architecture and density, indistinguishable from the epiphysis and diaphysis in its neighbourhood. Cases of recent union, where a thin line was still seen in the place of epiphysal cartilage, were classified as marginal cases.

We have divided the girls into eight age-groups of 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, and 17-18 years.

Summary of observations

Our observations can be tabulated as follows:—

Number showing union in each age group

	Years							
	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18
Number of girls ..	17	7	6	18	21	19	17	20
Lower end of humerus	0	0	3	16	21	19	17	20
Medial epicondyle ..	0	0	3	14	19	19	17	20
Upper end of radius ..	0	0	0	10	18	19	17	20
Lower end of radius ..	0	0	0	0	3	9	10	13
Upper end of ulna ..	0	0	0	15	21	19	17	20
Lower end of ulna ..	0	0	0	0	5	9	10	13

Lucknow, at the suggestion of the second who was at one time reader in forensic medicine at the Lucknow University. The paper is complementary to that of Lall and Nat (1934).

The object of the investigation was to ascertain the ages of the union of epiphyses of Indian girls, as it is commonly believed that they unite at an earlier age than do those of European girls.

The skiagraphic method was thought to be preferable to the purely anatomical method of the study of the epiphysal union of long bones, as investigations could be carried out on a larger number of normal subjects whose ages were definitely known.

We had to face great difficulties in obtaining subjects for this work, on account of the *purdah* system, and also of the prejudices of parents. However, we managed to enlist the co-operation of three local girls' schools to supply the material, and we examined 125 girls of different communities, varying in age from 10 to 18 years. The total number of skiagrams taken was 250, both antero-posterior and lateral views being taken to make sure of the unions.

The figures given in the table do not, however, easily lend themselves to generalization about the union of epiphyses, but, taking the age group of maximum increase in percentage of union and the youngest age group showing union of 90 per cent or over as criteria for our generalization, we may summarize the results of this investigation as follows:—

1. Lower end of humerus.

Union takes place before the age of 15 years.

Considering the high percentage of union (90 per cent) one is justified in stating that union takes place mostly early in the 13-14 age group, that is, about the end of the 13th and the beginning of the 14th year.

2. Medial epicondyle. Unites at 15 years.

3. Upper end of radius. Unites at 16 years.

4. Upper end of ulna. Unites at 15 years.

5. Lower end of radius and ulna. Unites at 19 years.

These results are at least about two years ahead of the figures given in various European textbooks of anatomy, and about a year ahead of the comparative figures obtained for Indian boys by previous research, carried out in this department (Lall and Nat, 1934).

Simultaneously, with the above radiological observations, we recorded the following data on the eruption of the teeth and onset of menstruation on the same cases. The results can be tabulated as follows :—

Age in years	Number of teeth erupted	Age in years	Number of teeth erupted
10-11	24-26	15-16	28-29
11-12	26-28	16-17	28-30
12-13	28	17-18	30-31
13-14			
14-15			

Out of the total number of 125 cases examined, 73 gave a history of the onset of menstruation as shown in the following table :—

Number of girls	Age of the onset of menses	Number of girls	Age of the onset of menses
6	11	17	14
13	12	9	15
27	13	1	16

From the above table we came to the conclusion that the menstruation starts in the majority of Indian girls between the ages of 12-14 years, and we also noticed that most of the girls examined showed signs of maturity at the age of 13 years.

Discussion

The calculation of age by radiography is not as accurate a science as lawyers and some doctors seem to think. What we are striving at is to get an approximate age for Indian girls from skiagrams which, together with puberty, teeth and general appearance, will enable us to give more accurate evidence of age in court.

Table showing the ages in years when union at the elbow and wrist joints occurs amongst Europeans and Indians

Parts	European standards	Indian boys	Indian girls
Lower end of humerus	16-17	15-16	14-15
Medial epicondyle ..	18	17	15
Upper end of radius ..	17-18	17	16
Upper end of ulna ..	16	16	15
Lower end of radius ..	20	19	19
Lower end of ulna ..	20	19	19

In 1936 in conjunction with his assistant, Rai Sahib Dr. Bhandari, the second writer drew up a table, summarizing the work done to date in India as regards the elbow and wrist joints. These joints have been chosen because more detailed examination of other bones is beyond the finances of an ordinary hospital; and also the examination of these joints can be carried out without undressing the children. These are important considerations in such an investigation.

Since this table was prepared the only Indian work on the subject is on 'Bengali Girls' by Basu and Basu (1938). We have incorporated these in the table below. It will also be noted that we have left out the head of the ulna. In our opinion this is one of the most difficult epiphyses in which to judge union, and there is such divergence of opinion by all authors that we have not been able to place reliance on it.

With regard to comparative figures given for England and America, we have taken anatomy books and x-ray specialist books on fractures, which are generally accepted as standard works on the subject. All have been quoted in the various Indian articles on this subject.

Union of epiphysis with diaphysis at elbow joint and wrist joint

Authority	Subjects	Lower end of humerus	Head of radius	Lower end of radius	Lower end of ulna
Cunningham	European	16-17	..	21	21
Gray .. ..	"	..	..	18-19	20
Frazer	"	17	..	22	20
Quain	"	16-17	..	..	..
Scudder .. ..	"	..	..	19-20	..
Spalteholz	"	17	..	..	..
Poland .. ..	"	..	..	19-23	18-20
Morris	"	17	..	20	20
Cohn .. ..	"	..	..	20-21	20-21
Buchanan	"	17	..	..	..
Ashhurst	"	15	..	..	..
Roberts and Kelly	"	20-22	..	..	..
Paterson	" males	18-21	..	..	..
	" females	14-15	14-15	19	19
Sidham and Derry	Egyptians	17-18	17-18	18-19	18-19
Hepworth (1929)	Indian	14½	14-15	16-17	16-17
Gai-taun (1930)	" girls, Bengal	14	13-14	14-15	16
Raghunandan Lall and Nat (1934)	" boys, U. P.	17	17	19	19
Raghunandan Lall and Townsend	" girls, U. P.	15	16	19	19
Basu and Basu (1938)	" " Bengal	13-14	13-14	16-17	16-17

(Continued at foot of next page)

THE TITRE OF COMPLEMENT IN A SAMPLE OF HOSPITAL POPULATION IN CALCUTTA

By R. K. GOYAL, D.Sc., Ph.D., M.R.C.P., F.R.S.E.
and

S. LAL, M.B., B.S.

(From the School of Tropical Medicine, Calcutta)

As there are no published records of the titre of complement in the blood of Indians, it was thought desirable to examine a series of apparently-healthy individuals. In this paper are recorded the results of the examination of 204 individuals of the type that attend a hospital out-patient department. The methods employed are summarized below. It was felt, however, that the estimation of complement without the determination of the hæmolysin present in the serum would give fallacious results and therefore hæmolysin present in each sample of serum was estimated.

Technique.—Three to four cubic centimetres of blood were drawn from the ante-cubital vein and kept in the incubator for 30 minutes, then left in ice-chest for three to four hours. The serum was separated, the complement titre and hæmolytic activity were then determined. A three per cent suspension of sheep cells and six

units of hæmolytic amboceptor were used. The test was put up as follows :—0.25 c.cm. of the serum under test, 0.25 c.cm. of the sheep-red-cell suspension and 0.5 c.cm. of normal saline. Sensitized red cells were used for the estimation of complement, the hæmolytic amboceptor was omitted in testing the hæmolytic property of the serum. The results were read after 30 minutes.

The complement titre was found to be equal to the hæmolytic titre in a certain percentage of cases, showing thus the absence of complementary activity of the serum as such. So the following calculation was adopted to determine the amount of complement as distinguished and free from normal hæmolysins. Complete lysis of red blood corpuscles with undiluted blood was taken as equivalent to one unit, a trace of lysis equalled 0.25 unit, partial lysis 0.5 unit and almost complete hæmolysis 0.75 unit. In this way, almost complete hæmolysis by 1 in 12 dilution of serum could be expressed as the serum containing 11.75 units. It was thus possible to deduct the hæmolytic figure from the complement figure and state the amount of corrected complement in a particular case.

In referring to the complement, we would mention data regarding corrected complement only unless otherwise stated.

(Continued from previous page)

Summary.—(1) In India, estimating the age of adolescents has only in the last few years been determined by x-raying epiphysial union.

(2) The subject, especially in females, has great medico-legal importance. No Indian medico-legal textbook has published any authoritative tables.

(3) Investigations at present published are confined to Bengalee and United Provinces girls.

(4) The number of cases examined so far are too few to generalize upon.

We can, however, say that the Indian girl is at least a year ahead of European girls in development between the ages of 10 and 20 as far as bony union is concerned.

We wish to thank the Lucknow University for placing at our disposal the means to carry out this work, and also Dr. A. P. Verma, who, as Kunwas Inderjit Singh's research scholar, has rendered valuable assistance.

We are hoping that this article will reach a wider circle of readers than the previous article in the *Indian Journal of Medical Research*. We apologize to any authors whose work on the subject has passed unnoticed.

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TABLE

	Num- ber of cases	Percentage distribution						
		Negative	Dilutions					
			0	2	4	8	12	16
Complement	204	1.5	0.5	22.5	58	12.7	2.9	1.9
Hæmolysin	204	8.3	8.3	40	41	2.4	..	..

It will be seen from the table that titre of complement present in the blood of hospital class Indians is somewhat lower than the figure obtained in Europe and America. In a series of 204 Indians, the average amount of serum to produce complete lysis of sensitized red cells was 0.06 c.cm. (range between 0.0156 c.cm. to 0.33 c.cm.), 1.5 per cent cases had no complement (uncorrected) in 0.25 c.cm. of the serum. The average amount of corrected complement was 0.147 c.cm. with a range between 0.017 to 1 c.cm. in positive cases. No complement could be demonstrated in 0.25 c.cm. of undiluted serum in 40.7 per cent cases. Hadjopoulos and Burbank (1928) examined a series of two thousand apparently-normal Americans; the average hæmolytic complementary titre was found to be represented by 0.04 c.cm. of active serum. Veil and Buchholz (1932) found the complement titre of normal blood in central Europe to range between 0.02 c.cm. and 0.06 c.cm. with an average volume of 0.05 c.cm. A similar titre was found by Tilden (1935) in America. Sera from a small series of (seven) apparently-healthy middle-class Indians gave a

lower figure, i.e., an average volume of 0.08 c.cm. (42.8 per cent positive, average complement 1.46 units, limits 0—8 units). A study of the table will show that hæmolysin, as distinct from complement, is present in the sera of a large number of individuals.

A similar examination carried out in a small series (nine) of apparently-healthy Europeans living in Calcutta showed a high titre of complement (complement present in all, average units of complement 5.05, limits 0.5—16.0). A similar series (15) of Anglo-Indians had complement present in 60 per cent (average units of complement 2.0, limits 0—10.5).

Analysis was made as regards age, sex, diet and the complement titre of the series examined. As the figures in the various groups are not enough for statistical analysis much significance is not attached to the conclusions which are as under :—

The complement titre was the same in various age groups. It was less in females (18 examined, 33.3 per cent positive, average units 0.87, limits 0—3.5) than males (186 examined, 61.8 per cent positive, average units 1.77, limits 0—14). As regards diet, a greater concentration of complement was present in non-vegetarians (16 examined, 81.25 per cent positive, average units 2.7, limits 0—6.5) than in vegetarians (37 examined, 65 per cent positive, average units 1.4, limits 0—7.75).

Bengalees take an excess of rice, whilst the non-Bengalees generally take starch in the form of bread. No marked difference was found between these two classes of people (Bengalees 130, 62.3 per cent positive, average units 1.85, limits 0—11.5. Non-Bengalees 74, 54 per cent positive, average units 1.41, limits 0—13.5).

The constitution of the individual appeared to have no effect on the complement present in the blood; 61 individuals suffering from filariasis attending the out-patient department apparently in good health gave results similar to the healthy individuals (55.7 per cent showing complement, with an average of 1.54 units, limits 0—14). Eleven diabetics were examined, all showed considerable amount of complement (percentage showing complement being 81.8, average units of complement 6.7, limits 0—13.5). In this connection it would be of interest to point out that Hadjopoulos and Burbank (*loc. cit.*) also found a high complement titre in pathological conditions giving rise to high metabolism.

Summary

An examination of the sera of 204 Indians revealed complement titre of 0.147 c.cm. as distinguished and free from hæmolysin.

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OBSERVATIONS ON SOME IMMUNOLOGICAL ASPECTS OF LEPTOSPIRAL INFECTIONS

PART II

By B. M. DAS GUPTA

(From the Department of Protozoology, School of Tropical Medicine, Calcutta)

IN a previous paper, we (Das Gupta, 1939) have noted that passive immunity can be induced in guinea-pigs following injections of anti-sera obtained from different sources, and the duration of the protection thus acquired is decidedly short and varies according to the nature of the anti-sera used.

This investigation was carried out to determine whether transference of passive immunity from the mother to the descendants does occur in leptospiral infection as in the case of some bacterial disease, such as diphtheria, and, if so, how long this congenital immunity would persist.

Method

Guinea-pigs were immunized either by inoculations of increasing doses of formalized cultures or by a single dose of 2 c.cm. of rich live culture followed 24 hours after by 0.25 c.cm. of immune rabbit serum given intraperitoneally. The latter procedure was found to be a very efficient and quick method of immunizing guinea-pigs against leptospiral infection. The sera of these animals agglutinated the homologous strain in a dilution of 1 : 10,000 in every case. This titre had not decreased till the 192nd day after the inoculation, when the sera were last examined. Besides, these sera showed well-marked protective power against infective inoculations—0.1 c.cm. protected guinea-pigs against 2 c.cm. of virulent culture. Animals of the same weight (serving as controls) which received 0.1 c.cm. of normal rabbit serum before the infective inoculation succumbed to leptospiral infection in from 7 to 10 days.

Five well-nourished adult immunized females were caged with full-grown males. After a period varying from 78 to 94 days these females gave birth to 3, 2, 3, 3 and 1 young ones, respectively. As the mother no. 4 killed all her young immediately after birth, the fourth litter could not be experimented on.

The gap between 62 and 188 days was purposely kept; for, the worker wanted to see whether congenital immunity would pass on to the second generation, although apparently unlikely. When the guinea-pig (a) of litter V was four months old it was caged with a male, but when it did not show any sign of pregnancy for six months it was given an infective inoculation lest its susceptibility to infection should have decreased with increasing age.

It was not possible to keep controls side by side for individual cases, but six guinea-pigs which were born of normal mothers and were

TABLE

Number of litters	Serial number of young ones in each litter	Time of inoculation with the infective material	Nature and dosage of infective material	REMARKS
I	(a)	Within 5 minutes of birth.	0.5 c.cm. of virulent culture	Remained alive and well for 3 weeks.*
	(b)	Within 30 minutes	Do.	Do.
	(c)	" 20 hours	Do.	Do.
II	(a)	On the 7th day of birth	1 c.cm.	Died two days after infective inoculation of some inter-current disease.
	(b)	" " 14th " " "	1 c.cm.	Remained well and alive for 3 weeks.
III	(a)	" " 28th " " "	1.5 c.cm. of liver emulsion of an infected guinea-pig containing innumerable leptospiræ.	Do.
	(b)	" " 45th " " "	1.5 c.cm. of virulent culture	Do.
	(c)	" " 62nd " " "	Do.	Do.
V	(a)	" " 188th " " "	2 c.cm. of virulent culture	Died of leptospiral infection on the 9th day of inoculation.

* Animals that remained alive and well for three weeks after the infective inoculation were considered to be protected against the infection.

of varying ages (20 hours, 4 days, 10 days, 32 days and 6 months respectively) were inoculated with the same strains and proved extremely susceptible to the infection, although the guinea-pig no. 6 of this control series showed an unusually long incubation period.

Remarks.—It will be seen from the foregoing table that young guinea-pigs born of immune mothers up to the age of 62 days remain insusceptible to infection with the homologous strain. This finding is significant because it shows that the use of guinea-pigs born of immunized mothers for diagnostic inoculations would lead to fallacious results because of their acquiring a considerable degree of refractoriness to the infection up to 2 months of their age, *i.e.*, the period when they are suitable for inoculations for purposes of diagnosis.

During our investigation into leptospirosis for the last two years, it has been our experience that a certain number of guinea-pigs inoculated with the infected material develop the disease but recover spontaneously. These animals acquire absolute immunity against further infection.

Summary

Young ones born of mothers (guinea-pigs) actively immune to leptospiral infection exhibit marked resistance against homologous infection. This resistance persists till the 62nd day after birth but not up to the 188th day. It is therefore suggested that the female guinea-pigs which have acquired immunity by some means or other

should not be used for breeding purposes as the young born of these animals are unsuitable for diagnostic inoculations.

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A HOME-MADE 'TOMOSCOPE'*

By WILFRED G. JONES, B.Sc., M.D.

Medical Superintendent of the Wanless Tuberculosis Sanatorium, Wanlesswadi

and

E. W. BRADLEY-BOWRON

Manager

A TOMOSCOPE is an apparatus that takes an x-ray film of a narrow section of the body. Just as a book on anatomy shows relationships in a cross section, a sagittal section (an antero-posterior plane), or a lateral section, so a tomogram (the film made by a tomoscope) is an x-ray of a similar 'section' of the body. These tomogram sections are usually made in a lateral (side to side) plane; *e.g.*, in figure 1, we have a rough cross section of the chest at the level of the heart. A series of tomograms at sections A, B, C, D, and E would include most of the lung tissue, and any cavity, x, would be found, unless it was very small, as cavity y. If we know approximately where the cavity is, the tomograms may be taken close together as at D, G, and E. Usually, for

* Selected for special tuberculosis number but held over on account of lack of space.—Editor, *I. M. G.*

the sake of economy, the tomogram may be limited to a half or a quarter film, so the process is not expensive, as four such exposures are sufficient for most cases.

A sectional tomogram as described above is not a competitor of an ordinary postero-anterior x -ray film, but is extremely useful when the cavity is invisible on the flat film on account of obscuring densities, pneumonic consolidation, or overlapping bone shadows; or when the cavity is mistaken for a pneumothorax pocket, or is lost in a hilar shadow.

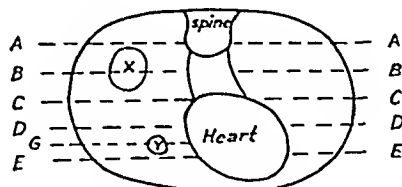


Fig. 1.—Cross section of the chest.

The original tomoscopes were developed in Germany, and are quite elaborate affairs, selling for Rs. 7,000 or so. To understand the principles involved we constructed a simple cardboard model, illustrated in figures 2 and 3. Two boards are connected together by a cross member HJ. On the larger board is drawn a diagram representing a cross section of the body. The smaller board represents a cassette holder. Lines projected from the x -ray tube A, through

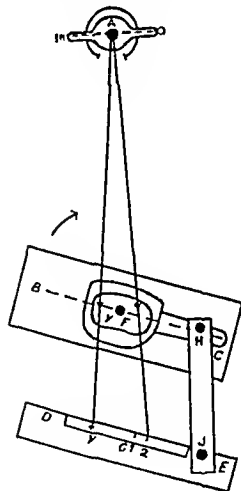


Fig. 2.

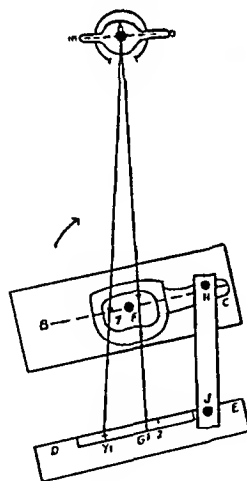


Fig. 3.

- A .. x -ray tube.
- F .. Chair with adjustable sliding seat.
- G .. Stand for cassette holder.
- HJ .. Connecting rod between chair and cassette stand.

a point y in the body, fall on point y_1 on the cassette, and these two points remain in line (i.e., in focus) even when the boards are rotated about 90° to position in figure 3. Similarly, any other point on the focal plane BH will be in focus and hence clearly projected to the cassette and its film. This is not true of any other point in the body not in this focal plane, e.g., the point v which is projected to point 1 on the

cassettes in figure 2, and to point 2 in figure 3. The image will therefore not be a point but a blurred line. Similarly all other tissues not on the focal plane BH will be blurred as the body and cassette are rotated.

It will be noticed that the focal plane BH is fixed, as the anterior board rotates on the two fulcrums at F and H. But the focal plane may be set at any part of the body by merely placing the body diagram forward or backward on the board. In figures 2 and 3 the double outlines represent a chair seat with a body on it. A sliding adjustment of the seat on the board would give a flexible arrangement which is mechanically simple to reproduce.

The cardboard model which was made by one of us (E. B.) clearly demonstrated also that the lines of x -ray projection are not altered in the least whether the x -ray tube be moved through an arc while the body is stationary, or the tube be motionless and the chair and cassette be rotated as illustrated in figures 2 and 3. (In the first instance, when the x -ray tube is rotated, it is the tube and cassette that are coupled together to give synchronous motion.)

This demonstration settled for us the matter as to which method to employ in our home-made model. Rotation of the x -ray tube through an arc necessitated a shock-proof apparatus which we did not have, and entailed expense that we could not consider. In the German models the movement of the tube is from head to foot of the patient, i.e., perpendicular to the axis of the ribs. While this is theoretically correct we found out by actual practice that rotation of the chair parallel to the ribs did not seriously interfere with the demonstration of cavity shadows in our cheap machine.

Moreover the vertical position of the patient which is obtained in the model we have developed allows for the natural position of the lungs during tomography and clearly reveals levels of fluid in pulmonary cavities. This is of great value in locating cavity shadows, which at times is not easy.

Our machine is exceedingly simple. Two vertical axes (Ford front wheel axes) are set in a solid wooden base, about 16 inches apart. A chair is firmly fixed to the anterior axle. The chair seat with its back is set on two sliding bars mounted on the rotating base, and there is a pin arrangement to lock the seat firmly at any desired position relative to the fixed point—the axle which is the centre of the focal plane. On the right side of the chair base is a scale showing in centimetres points in front or behind the focal plane, which works in conjunction with a pointer on the sliding seat, and a corresponding scale on the chair back readily permits calculation of the focal plane in relation to the chest of the patient sitting in the chair.

On the rear axle is mounted a wooden frame to which the cassette holder is fixed, and which can be adjusted to the height of the patient. During exposure the cassette rotates in such a

way that it is always parallel to the focal plane of the chair. The wooden frame must be made of such materials that will not permit vibration of the cassette during the exposure of the film, whilst it is rotating. A connecting bar from chair base to cassette stand insures equal and simultaneous rotation of the two parts.

An x-ray tube is set in front of the patient approximately at a distance of four feet (see figure 4). The patient is rotated so that his

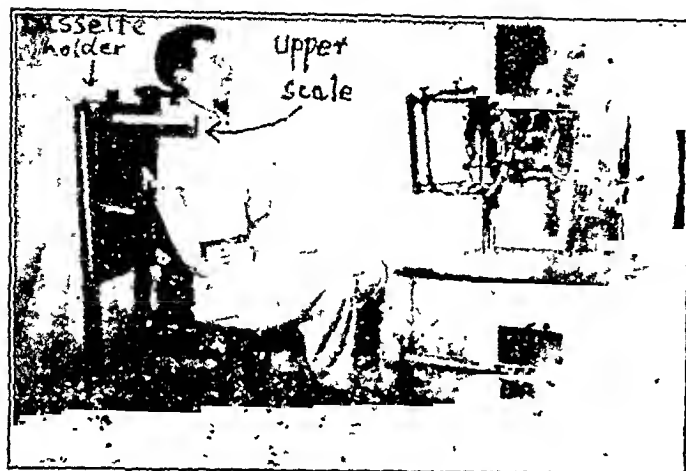


Fig. 4.—Tomoscope. Seat focus adjustment.

face is at an angle of 45° to the x-ray tube. On release of the catch the patient and the cassette rotate towards the x-ray tube about 90° by means of a series of opposing springs that are put under tension by the rotation. While they are so rotating an x-ray exposure of approximately $\frac{3}{4}$ to 1 second is made. At 100 MA the KVP is about 10 volts more than for an ordinary x-ray exposure at the same distance. The cost of this machine was Rs. 50.

The number of exposures that will be necessary in any case depend on the estimated size

of the cavities to be located. From four to six exposures 1.5 to 2.0 cm. apart are usually sufficient, though we have taken as many as nine at a 1-cm. interval in two cases.

In the following section we give a number of examples of cases showing definite cavities. Equally important, however, is the fact that we have found the value of a negative result also very great. We can rely on the absence of cavities of any appreciable size in such negative cases, and therefore have an assurance that collapse therapy is not imperative for closure of cavities but simpler measures may be sufficient.

Case 1.—Male, aged 30, admitted with a left pneumothorax, tuberculous empyema and an adherent apex (figure 5). The right side showed diffuse involvement also. The general condition of the patient was poor.

Figure 6 shows the true condition of the left apex, and explains why the pneumothorax was not effective in curing the patient. He should never have had continuance of the pneumothorax but thoracoplasty to close the cavity before empyema and contralateral spread made any treatment impossible.

Case 2.—Enid, age 20. Figure 7 shows the large amount of bilateral disease present on admission. Figure 8 taken nearly one year later shows an almost complete pneumothorax, but the sputum remained positive.

Several tomograms of the right apex had failed to show any cavities. But a tomogram of the left apex (figure 9) taken a little later shows an unsuspected buried cavity.

The pneumothorax was therefore abandoned and thoracoplasty done (figure 10). The disease on the right side cleared away spontaneously. The cavity is now closed, the sputum persistently negative, and the case discharged as apparently arrested.

Conclusion.—1. Tomography in chest surgery is very helpful in locating cavities not visible in the ordinary flat film.

2. A simple tomoscope can be constructed at low cost and it functions quite efficiently.

A Mirror of Hospital Practice

NOTES ON CASES OF PHTHISIS TREATED WITH PARENTERAL GOLD

By S. K. DAS, M.B. (Cal.)

Visiting Physician, Islamia Hospital, Calcutta

Case 1.—Moderately advanced bilateral lesion treated with gold alone.

A European male, aged 20, stated he had been treated in Rangoon with sanoerysin, calcium, and later solganol. He gave a history of hæmoptysis, sometimes profuse, for the past 18 months, and he had a dry cough with a slight evening rise of temperature for the past six months. His appetite and digestion were good and he complained of dyspnoea and palpitation on exertion.

The man was very emaciated and weighed 8 st. 13 lb. He had crepitations on the upper zones of the lungs on both sides, more on the left and there was congestion of the throat.

He was placed on 'home sanatorium' regime and a total of 3.2 gm. of myocrysin was given at weekly

intervals in accordance with the dosage table given in the *Indian Medical Gazette*, 1939, Vol. LXXIV, p. 328. The urine remained free from albumin throughout.

The result of treatment was a gain of 9 lb. in weight; sputum and cough stopped; hæmoptysis stopped; temperature remained normal; dyspnoea and palpitation with moderate exercise disappeared; the vital capacity remained and the sedimentation rate of the red cells fell from 68 to 8.

X-ray plates taken before (figure 1), and after (figure 2) treatment showed concentration of the lesions with formation of dense productive infiltration on both sides.

Case 2.—Moderately advanced bilateral lesion treated by phrenic evulsion on the more active side and gold therapy.

The patient was a Hindu male, aged 25 years. He had a troublesome cough and a large amount of expectoration. Hæmoptysis which began about a year ago was profuse. He had a continuous temperature ranging between 99.5°F . in the morning and 101.5°F .



Fig. 5.



Fig. 6.



Fig. 7.

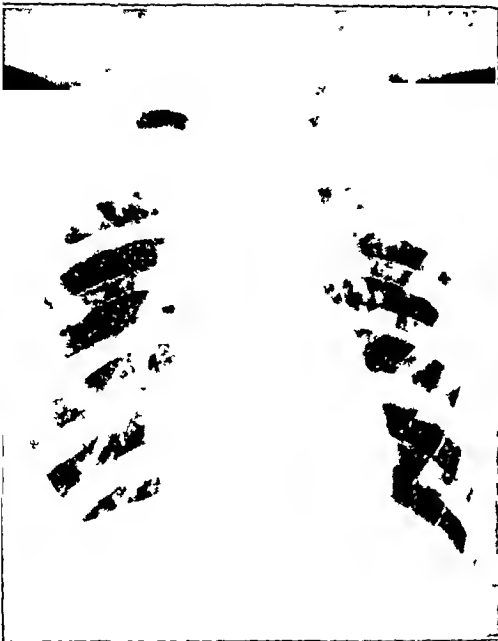


Fig. 8.



PLATE XXIV

Notes on Cases of Phthisis treated with Parenteral Gold: S. K. Das.



Case 1. Fig. 1.



Case 1. Fig. 2.



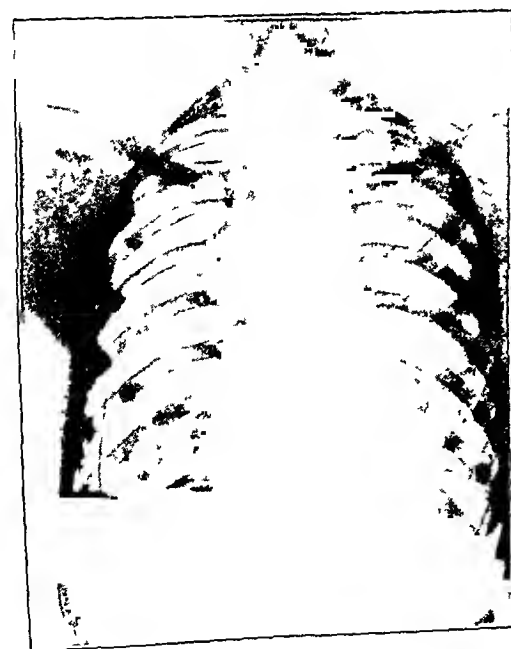
Case 4. Fig. 1.



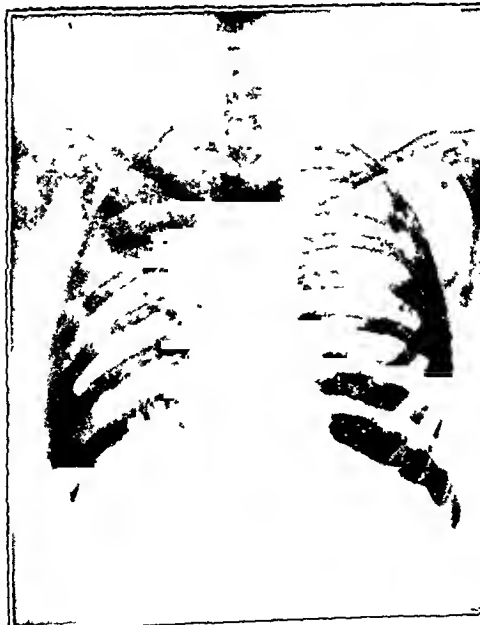
Case 4. Fig. 2.



Case 4. Fig. 3.



Case 4. Fig. 4.



Case 5. Fig. 1.



Case 5. Fig. 2.

in the evening. His appetite and digestion were bad. He complained of palpitation and dyspnoea even at rest and had pain on both sides of the chest. He was very emaciated. He had syphilis and gonorrhoea six years previously.

The man's weight was 6 st. 4 lb. There were crepitant râles on both sides of the upper part of the chest and signs of cavitation on the right. The urine contained a trace of albumin, casts and red blood cells. The x-ray showed soft infiltration of the upper and middle zones with a cavity on the right, there were scattered small foci in both bases.

Four inches of the right phrenic nerve was removed and this was followed for a few days by an enormous amount of purulent sputum and a high febrile reaction. After complete rest the temperature became lower but was never normal. Twenty-four c.cm. of 25 per cent glucose solution was given intravenously and 10 units of insulin hypodermically for three days and the albumin and casts disappeared. The first two doses (see table) of myocrysin in oil were given without any bad effect on the kidneys. The temperature fell a little, the appetite improved, the sputum became thin and scanty and contained much fewer bacilli. A few crepitations were still present on the right side.

The patient was now considered fit for sanatorium treatment in a cooler climate so he was sent away from Calcutta and is now living in the hills. He is afebrile, can take moderate exercise and has gained 9 lb. in two months. X-ray plates are not available.

Case 3.—Artificial pneumothorax combined with gold treatment with apparently more rapid improvement than with artificial pneumothorax alone.

The patient was a Hindu female, aged 28 years. A 4 para. Her mother died of tuberculosis three months ago.

She had had a dry cough for three months and profuse hæmoptysis. X-ray examination showed soft infiltration in the left sub-apical and middle zones. Left-sided artificial pneumothorax was performed and after four refills crisalbin in glucose solution was administered intravenously and a total of 2.8 grammes was injected. Eighteen months later x-ray showed the lesion in the middle zones as a simple scar and the sub-apical one had disappeared.

The patient is living an active life and has gained 2 stones in weight.

Case 4.—Early lesion of moderate severity; given artificial pneumothorax which was followed by usual complications.

A Hindu male, a student, aged 20 years. Has a slight cough and had a moderate hæmoptysis 15 days previously. Complained of weakness and loss of weight. A skiagram (figure 1) showed soft infiltration in the right upper zone and to a less extent in the middle zone. The left lung was normal. He weighed 6 st. 12 lb. Artificial pneumothorax was induced and was carried on for nearly three months and all symptoms showed abatement. An x-ray (figure 2) taken at this time showed beautiful selective collapse but there was a little fluid at the base. Treatment was continued and four weeks later the patient had a continuous high temperature for four days with pain on the right side and cough. There was succussion splash on the right side and dullness up to the fourth rib. Clear serous fluid was found on exploration and some of it was removed, but complete evacuation was not possible as it was in separate pockets. Calcium and diuretics were prescribed and some of the fluid was absorbed. Artificial pneumothorax was abandoned on account of adhesions. Gold therapy was advised but could not then be undertaken. An x-ray (figure 3) a month after this attack showed the right chest to be filled with fluid up to the second rib and there was an early infiltration in the left sub-apical area.

Myocrysin injections were begun and are still being given. The patient is now symptom free. A skiagram

(figure 4) shows great improvement, the fluid is absorbed and the lesions show definite productive reaction and the weight is now 7 st. 8 lb.

Case 5.—Unilateral lesion with failure of artificial pneumothorax and phrenic evulsion performed later.

A Hindu female, aged 22 years—primipara. Complained of cough for six months with scanty expectoration. Epistaxis (? hæmoptysis) six months ago. Appetite bad, digestion good but says she is subject to vomiting, bowels regular. Had a left pleural effusion about five years ago treated by removal of fluid and gas replacement, and had dysentery about the same time.

The patient weighs 77 lb. Wassermann reaction doubtful. There is amphoric breathing in the left sub-apical region and crepitations in the right middle zone. A skiagram (figure 1) showed soft infiltration in the right apical and sub-apical regions and patchy infiltration in the lower zones and a very small patch in the left sub-apical region. Pleural thickening of both bases and small calcified spots on the left side.

Artificial pneumothorax on the right side was induced but failed so $3\frac{1}{2}$ inches of the right phrenic nerve was removed. Intravenous treatment with crisalbin was begun five weeks later. The patient had an attack of malaria during this treatment which was treated with atabrin. A total of 2.75 grammes of crisalbin in glucose was injected according to the dosage given in the table (*Indian Medical Gazette*, 1939, Vol. LXXIV, p. 327.)

The patient is steadily improving, she is gaining in weight, has no symptoms, her temperature is normal and she can take a moderate amount of exercise. A second x-ray plate (figure 2) shows disappearance of the infiltration and formation of scar tissue.

HYDATID DISEASE OF THE LUNGS

A CASE REPORT

By R. N. CHOPRA, C.I.E., M.A., M.D., Sc.D. (Cantab.),
F.R.C.P. (Lond.)

BRIVET-COLONEL, I.M.S.

C. L. PASRICHA

MAJOR, I.M.S.

and

S. LAL, M.B., B.S.

(From the School of Tropical Medicine, Calcutta)

MAPLESTONE (1933) after reviewing the recorded cases of hydatid infection in India suggests that there is a strong probability that the incidence of hydatid disease is commoner in India than the records in the medical literature indicate. Sami (1938) drew attention to the relatively high incidence of hydatid disease in certain rural areas in the Punjab. This author records 27 cases of hydatid infection proven by operation and 13 others in which a clinical diagnosis of hydatid infection was made but operation was refused. These patients were seen in the course of six years and the *Indian Medical Gazette* (Editorial, 1938) commenting on this report stresses that these figures probably only represent a fraction of the actual cases that really exist in the area. A search through the published records in India reveals only two recorded cases of hydatid cysts of the lungs, Tulsi Dass and Prithi Chand (1934) and Ukil (1937). The following patient was brought to one of us for opinion with a history of long-standing lung trouble and with a knowledge of

the existence for years of a hydatid cyst of the lung which had been confirmed by x-ray photograph. As the condition is comparatively rare in medical literature in India it was thought advisable to record this case.

Case record

The patient, a middle-class Bengalee Hindu male, 38 years of age, resident of the district of Hooghly, gave a history of general ill health for the past 12 years and that 10 years ago after being under suspicion for some time as a tuberculous patient x-ray examination revealed the presence of a dense mass in the left apical region which was thought to be a hydatid cyst. His general health had been fair and he had not suffered at any time from marked pulmonary symptoms. Three months prior to being seen in November 1938 the patient had rigors almost daily and had suffered from pain in the right side of the chest. He was admitted to the Carmichael Hospital for Tropical Diseases for further investigation.



On physical examination there was an area of dullness and absence of breath sounds in the left upper lobe. Liver was enlarged to the umbilicus but showed no irregularities of the surface or the border. The spleen was just palpable. There was moderate degree of hypochromic anaemia and the differential count was within normal limits with 3 per cent eosinophil cells. Sedimentation rate was increased and was 25 mm. in the first hour and 110 mm. in the second hour with a cell volume of 34.3 per cent. Nothing else abnormal was noted. Antero-posterior and lateral skiagrams showed a large circular opacity in the upper zone of the left lung. When seen stereoscopically this opacity appeared to be globular in shape and the size of a small coconut. The lung tissue at the lower and inner margin appeared to be compressed. There was no evidence of a cyst in the liver or the spleen, both of which were enlarged and denser than normal. When compared with the skiagram taken ten years previously the shadow now is denser and about one inch larger in diameter. There is no infiltration of the lung tissue, which appears to be pushed aside. The characteristic clear-cut sharply-defined outline of the cyst is well seen.

The intradermal test of Casoni gave a well-marked reaction. The fluid used for this test had been obtained three days previously from a hydatid cyst removed by operation from the mesentery of a patient. This fluid injected into healthy individuals gave no reaction.

During his stay in the hospital the patient had rigors almost daily with rise of temperature to 102 or 103°F. Repeated examinations of the blood showed no malarial parasites. The rigors were brought under control by a course of atabrin, after which the patient improved in general health.

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LYMPHO-SARCOMA OF ILEUM

By A. E. STEVENS, F.R.C.S.D.

Chief Medical Officer, The Salvation Army, Thomas Emery Hospital, Moradabad, U. P.

THE rarity of this condition prompts the publication of this report.

The patient was an Indian male, aged 24 years, unemployed. Admitted to hospital 7th April, 1939.

History.—Pain in the abdomen for three months, usually all over, but often worse on the right side. Frequent attacks, lasting about 24 hours. Occasional vomiting. Appetite poor. No loss of weight noticed. No cough. No fever. Bowels constipated. No urinary symptoms.

Past history.—No serious illness.

Examination.—Healthy looking man. Tongue clean. Abdomen—Small tumour, size of an egg palpable just below and to the right of the umbilicus. Easily movable but tender to touch. No rigidity of muscles. Liver and spleen not felt. Heart and lungs normal.

Laboratory findings.—Blood—Haemoglobin 55 per cent. Red blood corpuscles 2,384,000. Total leucocytes 10,200. Polymorphs 72 per cent. Lymphocytes 21 per cent. Large mononuclears 2 per cent. Eosinophiles 2 per cent. Myeloblasts 3 per cent. Malaria parasites not seen. Kahn test negative. Urine normal. Stools normal.

10th April, 1939.—Laparotomy performed. Growth found in the ileum about two feet from the ileo-caecal junction. Two glands present in mesentery. Excision of growth and glands with one foot of intestine. Intestinal anastomosis. Other abdominal viscera appeared normal.

Convalescence was satisfactory though he suffered from a little post-operative diarrhoea.

1st May, 1939.—Discharged from hospital. Wound healed. No pain. Bowels acting normally. Appetite improving.

Patient was seen on 21st June, 1939, when he had started to gain weight, his bowels were acting normally, and his general condition was very good.

Pathological findings.—Macroscopically the growth was a white homogeneous sessile mass 1½ inches long by 1 inch wide, projecting into the intestine for about half an inch. There was no ulceration. The glands were of a homogeneous consistency and rather white.

Microscopic report.—Lymphosarcoma with metastases in the lymphatic glands.

Comment.—Most cases of sarcoma of the small intestine are reported from the post-mortem room, as they have manifested themselves by their secondary deposits. This case presented itself in the early stage before there was gross glandular involvement, and so was amenable to total eradication.

I am indebted to Dr. Hameed, Provincial Pathologist to the United Provinces, for the pathological report of this case.

Indian Medical Gazette

OCTOBER

THE QUININE FRAUD

THE pages of the *Indian Medical Gazette* have often been the scene of the struggle between the champions of two methods of quinine administration, the oral and the intramuscular. In these discussions, we have, at any rate during the last decade, kept an open mind, but with a slight prejudice in favour of the supporters of the oral method which we believe is the method of choice in ninety-nine cases out of a hundred. It is not our intention to revive this controversy.

Sir John Megaw, a former editor of this journal, analysed the reasons for the failure, or apparent failure, of quinine by mouth, and one of the first reasons he gave was the absence of quinine from the mixture which was supposed to contain it. He collected samples of so-labelled quinine mixture from a large number of government dispensaries from all over India and tested them for their quinine content; he found that the vast majority were under strength, that many samples contained no quinine or other cinchona alkaloid, and that in many more the quinine was reduced to a dose which would be ineffectual in controlling malaria in patients to whom it was given. In such circumstances, it is not surprising that failures of oral quinine are frequently reported and that intramuscular quinine which is given in the form of a sterile solution made from specially prepared, often proprietary, tablets gains favour.

It was at least thirty years ago that Sir John started this campaign against under-strength quinine mixtures, and the subject was again revived by the Drugs Enquiry Committee under Colonel R. N. Chopra in 1931. They found a similar state of affairs and used this evidence to strengthen their recommendations regarding the legislative control of the drug trade, and of the profession of pharmacy. Not many of the excellent recommendations of this committee have yet been put into operation, but a beginning has been made by the establishment of a Drug Standardization Laboratory at the All-India Institute of Hygiene and Public Health in Calcutta. Elsewhere in this number will be found a paper from this laboratory reporting their experience in connection with quinine and cinchona alkaloid mixtures and tablets, collected from dispensaries and also purchased in the open market. Their findings show that this quinine fraud—one can call it nothing less—is still being practised widely, not only in government and other charitable dispensaries, but on the purchasing public.

Of the 100 samples of quinine mixture examined, 64 were below strength; of these, two

samples contained no quinine or other cinchona alkaloid, 13 less than 30 per cent of the amount claimed and 25 less than 60 per cent. The quinine tablets were little better, as 22.5 per cent contained less than 60 per cent of the amount claimed on the label. Tablets of Indian and foreign origin were equally represented amongst the deficient samples, but, of the quinine salts and cinchona febrifuge powders tested, 62.5 per cent of the Indian samples were below strength.

It is hard to believe that those who refuse to take any measures to remedy such a state of affairs and who repeatedly shelve legislation directed towards the proper control of the drug trade can appreciate the significance of some of these findings. Malaria is a common disease in this country, but it is also a very fatal disease. Malarial attacks vary in their seriousness, and we all know perfectly well that in the large majority of cases, even if no drug is taken, the fever will last a few days and then subside, but we also know that there are heavy malignant tertian infections, with numerous parasites to be seen in every field of the blood film, in which immediate treatment is necessary to save the life of the patient; if in such a case the 'quinine' which is given is not quinine at all, but bicarbonate of soda or some inert substance—as was the case in several of the samples tested by Dr. Bose and his co-workers—that patient will almost certainly die. The man who withheld the quinine from that tablet or mixture or who allowed it to be labelled 'quinine' when he knew that it was not quinine was as surely the murderer of that unfortunate patient as he would be had he thrust a knife into his back; the accessories are the doctors who did not see that the quinine came from a 'reliable source' and the authorities who make no effort to ensure that every source available to the public is a 'reliable source'.

Surely, if it was possible, as in the recent emergency, to take strong punitive action against the opportunist profiteers, it should be possible to take action against this chronic and deadly form of profiteering. The police do not wait for the murderer to strike; they arrest him as a suspicious character for carrying a knife. Similarly treated, the purveyor of quinine-less 'quinine' tablets would find it much more difficult to establish his innocence than would his fellow suspect with the knife.

That some of the deficiencies of quinine in the mixtures is due to carelessness and not all to dishonesty is shown by the fact that 16 samples were actually over strength, some to a dangerous degree. Carelessness in a dispenser is however as great a crime as dishonesty and this only emphasizes the need for legislation to control the profession of pharmacy.

The Government of India have shifted the responsibility on to the provinces; will not some of the more progressive provincial governments

shoulder this responsibility and rise to the emergency—as an emergency it must be con-

sidered—in the way they have done so admirably in the recent national emergency?

Special Article

A NOTE ON THE MEDICAL ETHNOLOGY OF TUBERCULOSIS IN THE HILLS AND FRONTIER TRACTS OF ASSAM

By E. S. PHIPSON, C.I.L., D.S.O., M.D., F.R.C.P.

COLONEL, I.M.S.

Inspector-General of Civil Hospitals, Assam

INTRODUCTION

IN attempting to introduce, for the first time, among primitive oriental peoples, a concept of tuberculosis based on scientific truth, the acceptance of which, even in the western world, is little more than fifty years old, it is plainly of interest, and of some importance, to endeavour to ascertain the nature of the beliefs regarding tuberculosis which are actually current among the primitive tribes themselves.

Perhaps the most important single point to discover in such an enquiry is whether or not the disease, which is well recognized among all the principal tribes of Assam, is, apart from all the extraneous trappings of superstition and ignorance, recognized as communicable from one person to another. It is upon this one basic fact, more perhaps than upon any other, that every rational scheme for limiting the ravages of the disease must necessarily be founded, and if it can be established that this single concept of the disease is embodied in, or at least not obviously at variance with, tribal beliefs, there is at once some ground in common and a foundation on which it may be found possible to build.

The population of Assam, according to the 1931 census, is about 9½ millions; of these about one million are classified in the *Census Report* as tribal, i.e., 'persons who still worship their tribal deities in their own fashion'. The tribal inhabitants of Assam naturally preponderate in the hilly and mountainous regions which constitute more than half the area of the province, though they are represented in every administrative district, as shown approximately in the following table, abstracted from the 1931 *Census Report* (Chap. XII—Appx. ii).

District	Tribal inhabitants
Goalpara	89,000
Kamrup	20,000
Darrang	44,000
Nowgong	53,000
Sibsagar	32,000
Lakhimpur	15,000
Balipara Frontier Tract ..	1,000
Garó Hills	137,000
Khasi and Jaintia Hills ..	201,000
Naga Hills	148,000
North Cachar Hills	5,000
Lushai Hills	60,000
Sylhet	4,000
Cachar Plains	5,000
Sadiya Frontier Tract ..	23,000
(Manipur State)	155,000
APPROXIMATE TOTAL ..	992,000

The problems, therefore, towards the solution of which the present enquiry was directed, concern a group of inhabitants who comprise nearly one-ninth of the population of Assam but who may be said to inhabit an area equivalent to over half the total area of the province, and on these grounds alone deserve and require special study.

Apart from a very limited personal acquaintance with the medical ethnology of hill tribes in Assam, the data on which this brief study is principally based, were forthcoming as the result of an enquiry which the writer instituted among the officers administering the areas included in the Khasi and Jaintia Hills, the Naga Hills, the Hills of Northern Cachar, the State of Manipur, the Sadiya Frontier Tract, the Balipara Frontier Tract, the Garó Hills and the Lushai Hills; and the writer is greatly indebted to these administrative officers for collecting and placing local information at my disposal.

The principal object, then, of this enquiry was to ascertain if, and to what extent, the basic principles of the management of tuberculosis could be grafted on to or interpolated between tribal beliefs, so as to avoid any serious clash between scientific truth and tribal superstition. On the whole the result of the enquiry may be regarded as fairly favourable.

THE SCOPE AND NATURE OF THE ENQUIRY

The original enquiry, the scope of which was afterwards extended, had particular reference to the Naga tribes, and an outline of the propaganda was devised, and simple measures designed to meet the requirements of the Naga and similar tribes were circulated for opinion among the officers responsible for the administration of the various areas indicated above. The proposals circulated were as follows:—

A. Simple propaganda

(1) That the spread of the disease from one member of the family to the other is by means of the sputum which the sufferer spits on the floor of his house and which, after it has dried, is mixed with the dust of the house, and when stirred up by wind or by sweeping, rises into the air and is inhaled by other members of the family who are then liable to contract the disease, and that even the act of coughing, apart from spitting, infects the ground with some of the dangerous material.

(2) That the sputum, which is full of minute 'flies' only visible under a 'hospital telescope', and which is coughed up by the sufferer on to the floor of the house, particularly in the dark inner rooms of a tribal house, remains dangerous

for weeks or months but its power for causing harm can be abolished by the action of the sun and still more rapidly by fire, and for this reason, when a sufferer spits on ground outside a house and the sputum is exposed to many hours of sunlight it is not likely to infect anyone else, but it is extremely dangerous on the floor of an inner room of a house where sunlight never penetrates.

(3) That if the sputum of the sufferer is collected in a special vessel and the contents poured into the ashes of the family fire every day and the fire built over the ashes the poison will be destroyed and cannot harm any one.

(4) That if healthy members of the family live in the same room as a sufferer they are much more likely to contract the disease than if they live and sleep in another room of the same house. This is because the sufferer spreads the disease by coughing and sneezing as well as spitting. If, therefore, the sufferer has a room to himself the rest of the family are likely to escape the disease altogether, particularly if the sputum is collected and burnt as described above.

(5) That if, in addition to the provision of a separate room for the sufferer at the back of the house, the roof can be extended backwards or sideways covering a small open verandah connected with the back room of the house where the sufferer can spend most of the day in the open air but protected from the weather, not only will the rest of the family be much safer but it will be of great value to the sufferer himself.

(6) That in the larger villages, where there may be several cases of phthisis in different families, much good would be done by the building of a *basha*, or shed, of a suitable size with at least one open side and containing *machangs* or beds, where the sick persons can remain during the day, having their food brought to them and returning to their houses at night, or they could eat their morning meal in their own room in the house and probably the evening meal too. The reason for this is that the patient himself is much better in the open air provided that he is protected from the weather, and that at least during the daylight hours members of his family are protected from any close contact with him which might spread the disease.

B. Preventive measures proposed

The propaganda detailed above was intended to furnish intelligible reasons for the actual measures to be adopted, which may be summarized as follows :—

(1) *Provision, free of cost, of specially designed spittoons* of a simple and distinctive character, if possible in brightly coloured glazed earthenware and provided with a loosely-fitting lid secured by a piece of cord. This spittoon could, of course, be made of other material such as brass or other metal, but its shape and character should be such that it is not likely to be used

for any other purpose. A stock of these spittoons might be kept in district and sub-divisional headquarters and in outlying dispensaries and issued as required on application by the *gaon-buras*, and in schools by the *pandits* or schoolmasters, or by chiefs who would be instructed to see that every household in which there is a sufferer is provided with one, to be replaced as required, and the family instructed how to use it.

(2) Home segregation of the patient

There can be no doubt that the method of segregation within the family itself, provided it is of a nature which would be accepted by the people, would have an important effect in reducing the spread of the disease and the type of partial segregation indicated in A(4) above might have a good prospect of gradually being accepted by the people themselves and recognized as a regular means of dealing with the disease.

(3) Some simple form of open-air treatment for the patient

The construction of the usual tribal house is such that in many cases the small verandah extension referred to in A(5) above could be added at a very little cost, as building materials are everywhere cheap, and, as stated, would have the double advantage of improving the patient's chances of recovery to a substantial degree and of protecting the other members of the family.

(4) Provision of communal segregation for larger villages

In the larger villages, containing a hundred or more houses, it is quite likely that there may be more than one house containing a sufferer from the disease, and in such cases the provision of a specially made open-sided *basha* as described in A(6) is likely to prove of considerable value. The communal *basha* could be in the village itself, if the nature of the ground permits, and need not, and should not, be at any great distance from it, with the object both of reducing the difficulty of sending food to the sufferer and of preventing the growth of any idea that the sufferers are outcasts, who have to be segregated in the same way that lepers are segregated. It is important to prevent any such idea developing among a primitive people who are quite familiar with the disease and who have hitherto attended the sufferer in his own home.

RESULTS OF THE ENQUIRY AMONG THE DIFFERENT TRIBES

I. Tribes of the Naga Hills

Phthisis is a complaint well known among Nagas and its prominent symptoms of cough, fever, loss of weight and spitting of blood are recognized as those of a definite disease which is capable of spreading from a sufferer to other members of the family. It is regarded as a disease which, once contracted, is, sooner or later, always fatal and the idea of a possible

cure does not appear to enter their minds. They believe that the disease has become more prevalent in recent years than it used to be, and they would welcome any practical means of reducing its ravages. In view of their experience of the fatal nature of the disease, when once contracted, they have no doubt that any efforts to deal with it should be in the direction of prevention in which they, in their own interests, are quite willing to co-operate.

The first development of the disease in any particular family and, to a lesser extent, the spread of the disease in that family after one member has been infected, is usually bound up in some way with tribal beliefs. Thus the *Kukis* regard it as the result of the accumulated sins of one's ancestors being too heavy for one man to carry. They do not expect it to appear in every generation but they say it continues in families. The tribal cure for this disease, which is not always effectual, is by doing certain *gennas* in killing dogs.

The *Western Rengmas* assign no particular reason for contracting the disease, which they call *kenghye*, but they have a cure for it, by administering with water a powder made from pounding the dried bodies of the flying lizard (*tsengonyaizhu*). It is significant that *Rengmas* will not drink or eat from the vessels used by sufferers from the disease.

The *Eastern Angamis* believe that the disease is contracted by brave or wealthy men, who eat flesh, fish, fowl or vegetables which are taboo.

The *Semas* believe that the killing of some other person's live-stock will be punished by the development of the disease, but it may be cured by drinking that person's water and be yours.

The *Southern Sangtams* believe that one can give the disease to one's enemy by giving him earth from a grave to eat.

Among the *Lhotas* the disease is regarded as the operation of a family curse which is the penalty of entering the house of a family or tribe formerly, or still, at enmity with the tribe or family of the person entering the house, who will eventually develop phthisis as a penalty for his imprudence. The supernatural reason assigned for the first case in the family does not hold to the same extent with later cases occurring in the family, except in the limited sense that though later cases may be the result of the operation of the curse, the rest of the family do not necessarily adopt a resigned and fatalistic attitude, but, on the contrary, would be quite willing, and even anxious, to adopt any measures that can be taught them to avoid contracting the disease, and moreover the idea of defeating the operation of the curse in other members of the family is one which appeals to them, not only as being worth doing for their own sakes but as evidence that the curse is lifting and is not so powerful as it was believed to be, the family honour being therefore proportionately enhanced.

The way is thus open for the introduction of simple measures designed to limit the spread of

the disease, and, as these in themselves do not appear to run counter to any tribal customs, there appears to be no reason why they should not be freely accepted and adopted, perhaps even with some degree of enthusiasm, as affording a means of defeating the operation of the family curse, or whatever other cause is believed to be operating.

II. Tribes of the Khasi and Jaintia Hills

These tribes are, generally speaking, in closer touch with civilizing influences, and both the propaganda and actual measures would be likely to be effective with the co-operation of the missions and school teachers.

As regards the *Khasis* of old, it is a remarkable fact, which I have on the authority of Dr. H. Lyngdoh of Jowai, whose specialized knowledge has been of great value in the preparation of this portion of this note, that the *Khasis* in the early days had no knowledge of any disease prevalent among them presenting the symptom-group cough, emaciation and spitting of blood, and that, unlike most of the hill tribes in Assam, had in consequence no ancient name for it.

The existing name for the disease among *Khasis* is *pang swai* (debilitating disease) or *bampong tor* (ulceration of the lungs). These names and a certain knowledge of the disease itself, have arisen only in the last thirty years or so, since their contact with western civilization—and no doubt to a large extent as a result of it, and there is a very good reason to believe that when they first began to contract the disease and had no natural or acquired immunity, the disease ran, and indeed still runs, a more rapid and virulent course, in much the same way as the introduction of measles into the virgin soil of the South Sea Islands in the last century led to an epidemic of exceptional severity attended with a high mortality.

In view of the ignorance, until recent years, among the *Khasis* of any disease presenting the symptoms of pulmonary tuberculosis, which is easily recognizable as a definite disease no matter what cause may be assigned to it, it is of particular interest to record that among the *Syntengs* (inhabitants of the Jaintia Hills) a disease having the symptoms of cough, increasing emaciation and spitting of blood, has been known to exist in their tribe from the earliest days. It is called by the *Syntengs* *pang kymbat* (*pang* meaning 'illness' and *kymbat* 'drug' or 'poison', or, perhaps, 'virus'). The name does not appear to indicate that a person suffers from the disease only after he has been drugged or poisoned, but it is believed that there are certain families in the tribe that possess some mysterious power of communicating the disease to others, and that persons who eat or drink in the houses of such families or take food touched by members of these families are likely to suffer from the disease. People, therefore, shun these suspected families and will avoid eating and

drinking in their houses or taking food that they have touched. The idea underlying these beliefs is clearly that the disease is communicable from one person to another.

The Wars (inhabitants of the southern slopes of Khasi and Jaintia Hills) have similar beliefs. They call the disease *krah* or *ai bih* which mean 'poisoned'.

It seems likely, therefore, that among the tribes of the Khasi and Jaintia Hills there is a reasonable prospect of some success attending the introduction of preventive and possibly curative measures based on the modern conception of the disease.

III. Tribes of the Garo Hills

Phthisis is known to the Garos as *gitok asi nanga*. It is not regarded as a common disease among those living in the hills, but is recognized as more frequent in the plains, and especially among the Nepali settlers in the hills, particularly those engaged with milk trade; the older Garos do not regard the disease as very contagious or dangerous to others, but look upon it as a curse on the family of a murderer for having taken food or drink with the family of the murdered person without making some peaceful compromise beforehand. It is generally considered that once the disease is contracted no cure is possible, but the idea of preventive measures would have to be instilled by careful propaganda.

IV. Tribes of the administered area of the Balipara Frontier Tract

The tribal elements in this area are scanty, and consist of Yanno Dafflas, Miris and Garos to the number of about 1,200. No information is available from the tribes in the unadministered area.

V. Tribes of the Sadiya Frontier Tract

The principal tribes are the Abors and Mishmis; and tuberculosis is well known to both. Examples of tribal beliefs in connection with tuberculosis are those of certain Abor tribes which follow.

Beliefs held by Abors.—The Pasis and Minyongs and Padams attribute tuberculosis to having incurred the displeasure of either of the spirit *doying-angong* who lives in the clouds, and *siking-kedeng* who lives on the earth. (These two are husband and wife, and may also cause other illnesses as well, but only serious ones.) The displeasure is invariably incurred by not having carried out a pujah correctly. Two of the more important pujahs are given below, failure to carry them out correctly being considered to invite a visitation of the disease: (i) *Abgang* (the pujah after hunting), (ii) *Mopun* (the pujah specially devoted to the two spirits mentioned above, and held in May. This is the pujah to ensure good crops in the

ensuing year.) The cures for them are roughly as follows:—

If, after the necessary ceremonies have been carried out by the old men of the village, it is discovered that it is due to not having carried out (i) correctly, then it is also necessary to find out which of the two spirits is angry.

If it is the dweller in the sky, then a red cockerel must be tied to a pole outside the house. It must be a red one or the spirit will not be placated. If it is the spirit of the earth, then the entrails of the cockerel are placed on the ground.

If it is due to failure to carry out (ii) correctly and the spirit of the sky is angry, then a squirrel (the small variety, called *bongko* by the Abors) must be tied to a post in the sufferer's house. If the spirit of the earth is angry, then the squirrel must be buried head foremost in the ground with rice and *apong*. There are several other details connected with the spirit of the earth of which the most important is that it is useless to bring the squirrel in any spot, as the spirit only lives in certain places. If a dog (which must be a red one) is used, or a pig, then they must be buried head first. Naturally it is first necessary to determine which offering will be acceptable.

The Gallongs do the same, with slight variations in the procedure. For instance, they eat the rest of the cockerel, after the entrails have been placed on the ground, and naturally their names for the spirits are different. The spirit of the sky is known as *talang*, the spirit of the earth is known as *sirumder* and they do not know them as husband and wife.

Beliefs held by Digaru Mishmis.—The symptoms of tuberculosis are recognized by the Digarus although it is probable that attacks of influenza and pneumonia, which end in the death of the sufferer, are sometimes mistaken for the same disease.

Dokhain is the tribal name for tuberculosis and its presence is usually accounted for by the village priest (*gwok*) of whom there is one in most, though not in all, villages. The *gwoks* say the disease is sent by a very evil spirit who cannot be appeased by any sort of pujah, the disease thus proving incurable. It is not however regarded as fatal until a second spirit, the death spirit, is sent into the sufferer. Pujahs are therefore performed with the object of trying to persuade the spirit of the village concerned not to send this second spirit into the sufferer as that would prove fatal at once. The pujahs are performed by killing fowls or pigs, half of which are put out for the spirits and half eaten by the people of the village. It is fatal to perform pujahs, however, without first consulting the *gwok* who thereby becomes the community-doctor, and is rewarded by gifts of opium and other suitable offerings. The only medicines used by the Mishmis for this are *Fatakkani* (Mishmi opium) and Mishmi *teeta*. The Government opium is said to be good to eat but is

of little use as a medicine compared with the Mishmi variety.

VI. Tribes of the North Cachar Hills

The population of the North Cachar Hills includes the following—Kacharis, Nagas, Mikirs and Kukis. Phthisis is believed to be fairly common among all tribes, but is more frequent among Kukis and Kacharis than among the others. The disease is well known among the hill tribes; the Kacharis call it *joka*. The Kacharis have certain medicines for it, but they do not claim to be able to cure it. It does not appear to them to be connected with any legendary beliefs, in contrast to the Kukis, who look on the disease as the result of their ancestors' wrong-doings.

Kacharis' houses are closed on all sides and measure about 30 feet by 15 feet with a mud plinth very seldom raised more than one foot from the ground; there are usually two openings, front and back; both of these are doors, there being no windows. The house is divided into two portions by a partition 12 feet high at the centre and 6 feet at the eaves. The first room is a sleeping room and the other is used as a kitchen. Separation or segregation of a tuberculous member of the family is therefore impossible in a house of this type, which has no verandah.

The Kuki's house is of the *chang* type, that is, it is built on posts, about at a height of some 3 feet from the ground. The floor is made of bamboo matting. There are no compartments, the house consisting of a single room, but it has a small back verandah which has no roof. This verandah might be roofed and used for a tuberculous person. The Mikir's house is similar to the Kuki's but higher off the ground, sometimes as much as 10 feet.

VII. The Manipuri tribes

There is some divergence between the customs and mode of life of the Manipuris of the hills, mostly tribes allied to Nagas, and those of the plains. Regarding the Manipuris of the plains, especially those who live in and near Imphal, there is one custom, which has a striking relevance to an anti-tuberculosis campaign,—that of building a *sangoi* or open shed, used for weaving and feasts, as part of the equipment of almost every Manipuri house, and which could readily be adapted as an open-air shelter for a tuberculous case, and might well be imitated by other communities as a communal *basha* if constructed on a rather larger scale.

VIII. Tribes of the Lushai Hills

In the Lushai Hills there is an excellent system, devised by the superintendent, Lushai Hills, by which matters of public interest are referred to the village welfare committees, under the presidency of the Lushai chiefs of villages.

These were formed so that executive orders could tend to be replaced by the acceptance by the people of good ideas for their own benefit from the point of view of health and otherwise. The organization, therefore, was of particular value in eliciting the kind of information the writer hoped to obtain through the good offices of the superintendent, Lushai Hills.

A questionnaire was addressed to these welfare committees including the following questions:—
(i) What did the Lushais of old think of tuberculosis or *ngawr*, and what method of treatment did they adopt and how did they treat those who were ill in this way? (ii) Was or is the belief held that *ngawr* is incurable? (iii) Was or is the belief held that this disease can be passed from one person to another? (iv) Was or is there any belief that *ngawr* was some form of vengeance or punishment by the evil spirits of old?

Added to this was a list of suggestions, based on the modern view of the prevention and cure of tuberculosis, and the committees were asked to say whether the suggestions would be acceptable to the tribesmen concerned and whether they would, on the whole, receive the support of the village committees.

The condensed answers to these questions are as follows:—

(i) Tuberculosis was regarded by the Lushais of old as a disease which went in families and it was not the general opinion that it was communicable between one family and another. It was generally believed that there was a danger of the disease persisting from one generation to another in the same family but the original infection was attributed to one of two causes in the case of the ordinary villages. The infection was either the result of witchcraft or of some offence against the social order as in the case of a man who ill-treated animals unnecessarily. In the case of chiefs or wealthy men infection was often held to be the result of jealousy on the part of a wizard who has hatred in his heart, or perhaps of over-feeding or drinking.

Sufferers from tuberculosis would always be well fed and nourished on the best available food which the patients might demand. At death if the symptoms included total swelling all over the body a public holiday or cessation from all ordinary occupation would be ordered. For the alleviation of suffering people resorted to sacrifices of various kinds. These sacrifices were called *mubu vial* or *sut zo ai*. If a priest was called in to perform sacrifice he would, on his return to his residence, have to perform a sacrifice before entering his home and if it so happened that the priest himself failed to cure the patient he himself would be in imminent danger of contracting the disease.

(ii) The disease was never considered to be incurable but the sacrificing priest should be stronger than the bewitching wizard responsible for the original infection. If the wizard was

detected the patient would seek the permission of the chief to kill his enemy and it was generally accepted by the Lushais of old that a cure would result from eating a portion of the dead man's liver. Some people were found to have dark marks on their skins, marks which could not be erased by washing. In such cases only the disease was considered to be incurable. Sacrifices involving the drinking of dog's blood, with or without turmeric, were said to be often efficacious in effecting a cure.

(iii) The general view to-day among the better-read and better-informed Lushais is that the disease can be spread through medium of a small germ invisible to the human eye except under a microscope, but the public, generally speaking, do not yet fully subscribe to this new idea. The older idea is that the disease, as already stated, was a family disease inherited from generation to generation till finally cured, and that it is not contagious at all.

(iv) There is no trace of the belief that tuberculosis was a disease associated with vengeance from superior gods or spirits. It was capable of generation by a wizard directing a spirit of hatred towards one of whom he was jealous. The object of this bewitching was the gain of property or mere personal hatred.

(v) It appears that in almost every case the people are quite willing to subscribe to the suggestions set before them and in many cases it is said that certain of the conditions such as partial segregation of the infected persons from the rest of the family are feasible and in themselves desirable. Only in one case in a distant village, not far from the Burma frontier, was it said that partial segregation would not be acceptable because the majority of the villagers did not believe that the disease could be communicated among people by germs.

Thus, among the tribes of the Lushai Hills there appear to be, on the whole, no insuperable obstacles, from the point of view of tribal customs or beliefs, to the introduction of a system of prevention and cure based on modern knowledge.

DISCUSSION OF THE RESULTS OF THE ENQUIRY

From the ethnological standpoint, there are certain obvious points of resemblance between the beliefs held by the several tribes as to the nature of tuberculosis, and a general tendency to regard some kind of sacrifice as holding out a prospect of cure. In practically all the tribes considered, even including such linguistically dissimilar tribes as the Khasi-Syntengs and the Naga tribes, the original infection is believed to be due to supernatural causes, either by way of retribution for infringement of some tribal taboo, or, by means of witchcraft, in satisfaction of some personal vendetta. The Abor tribes, on the other hand, ascribe the disease to the action, more arbitrary than connected with any idea of

retribution for tribal or personal misdeeds, of specially powerful spirits.

It is fortunately possible, nevertheless, to discern in the beliefs of nearly all tribes quite clearly in the case of some, and more dimly in others, the concept of tuberculosis as a disease which is either a 'family' disease (which, in turn, might be hereditary or the result of the very close association inevitable in tribal houses), or actually communicable from an infected person to a person outside the family, the exception being in the beliefs of the Abor tribes, who alone, among the tribes considered, regard the disease as the result of more or less arbitrarily-acting spirit-forces.

It is reasonable to suppose, therefore, that propaganda, suited to the intelligence of the tribes concerned, and based on the fundamental conception of tuberculosis as a communicable disease, is more likely to receive acceptance and bear fruit among the tribes of the former group than of the latter, among whom the seed seems destined to fall on stony ground.

It is, on the other hand, disappointing to find no trace of any type of tribal 'cure' which is worth encouraging for its own sake, comparable, for instance, to that which is in vogue among certain African tribes. Among the Somali tribe which I have in mind, the cure consists of living alone under a particular banyan tree at an altitude of about 4,000 feet for six months, subsisting solely on camel's milk, and never entering a dwelling-house during that period. The difference between this form of 'cure' and the simpler form of modern sanatorium treatment of tuberculosis is merely one of detail, and, as a cure, it is unquestionably effective in appropriate cases.

In Assam we must deal with beliefs as we find them, and it is some encouragement to be able to establish that pulmonary tuberculosis has long been recognized among many tribes as communicable, a fact which was long in dispute even in western countries until it was finally established by the work of Robert Koch less than sixty years ago.

The essential importance of the concept of tuberculosis as a communicable disease lies in the fact that, if the disease be communicable, it must, *ex hypothesi*, be in some degree preventable, and it is this idea, above all others, that needs to be inculcated in the primitive mind, not only to enlist active tribal co-operation but also to combat the idea, often concurrently held, that infection with the disease is either predestined or the result of the action of supernatural forces, whether vindictive, retributive, or arbitrary.

The measure of success to be achieved in any anti-tuberculosis campaign among primitive tribes may well prove to be the measure in which the rational element in tribal beliefs (the germ of which exists, as this enquiry has shown) can be fostered and, at least in this sphere, made eventually to supersede the irrational.

Medical News

WARNING NOTICE TO REGISTERED MEDICAL PRACTITIONERS

As a number of cases of advertisement by registered medical practitioners, in the lay press and by means of hand-bills, have come before the Madras Medical Council in recent months, the Council has, at its last Meeting, held on the 17th April, 1939, decided to warn all registered medical practitioners that all kinds of advertisement—including even the opening of private institutions, inviting laymen to attend functions connected therewith and publication of same in lay papers—by registered medical practitioners will be considered as advertisement under section 6 of the WARNING NOTICE published by the Medical Council, and will be dealt with accordingly.

(Sd.) N. M. WILSON,
MAJOR-GENERAL, I.M.S.,
President, Madras Medical Council.

IMPERIAL SOCIAL HYGIENE CONGRESS

A REVIEW of the provisions made for children in residential houses in the province of Bombay was made by Dr. Shakir Mohamedi, D.O.M.S., L.M.S., at the Imperial Social Hygiene Congress, at B. M. A. House, Tavistock Square, W.C.1, on 10th July.

The Congress, which opened on 10th July and lasted the week, was attended by 150 delegates from all parts of the Empire. A message of goodwill from the High Commissioner for India was read to the Congress at the opening session, and Indian delegates included representatives of the Government of Burma, of the universities of Allahabad, Bombay, Punjab and Rangoon, of the Bombay Presidency Women's Council and the Bombay Social Hygiene Council.

Dr. Mohamedi told the Congress that institutions, provided in Bombay for the reception of children who are orphans, homeless, ill-treated, or offenders, fall mainly into three classes. These are:—

1. Schools established and run by the Government.
2. Schools established by voluntary organizations and practically maintained by Government.
3. Schools established by voluntary organizations and aided by Government in respect of children committed in court.

These schools accommodated altogether 2,050 children.

The schools, he said, were regularly inspected and provided a varied curriculum covering a number of industries. One of the difficulties which had to be faced, he pointed out, was that education had to be provided in at least three languages.

Employment was not easy to secure for boys owing to unfavourable economic conditions in the cities.

In the case of girls, the aim, he said, was to marry them from the institutes whenever possible because there were no openings for safe employment of girls. Marriage negotiations were in most cases carried out by a managing committee of the various institutions, and a careful selection of candidates was made among suitable applicants. The girls, Dr. Mohamedi said, made the final selection. As a rule they were married within their castes.

'IRON LUNGS' FOR INDIAN HOSPITALS. SIX IN CENTRALLY ADMINISTERED AREAS. LORD NUFFIELD'S GIFT

Six hospitals in centrally administered areas which are considered suitable for the supply will benefit from Lord Nuffield's offer of 'iron lungs', or respirators, to hospitals in the British Empire about which an announcement was made some time ago. These hospitals are the following:—

1. Ross General Hospital, Port Blair.
2. New Victoria Hospital, Ajmer.

3. Civil Hospital, Mercara.
4. Irwin Hospital, New Delhi.
5. Lady Hardinge Medical College and Hospital, New Delhi.
6. Civil Hospital, Quetta.

Provincial Governments have been asked to communicate their requirements direct to the High Commissioner for India for transmission to the appropriate authorities.

Only those hospitals have been selected for receipt of the 'iron lungs', which can provide for skilful handling and maintenance of the apparatus in perfect working condition. The apparatus is worked by electricity, but in an emergency can also be operated by hand. Hand operation is, however, laborious and the machine is not recommended for use where electric supply is not available.

Though associated in the popular mind almost exclusively with the treatment of respiratory paralysis following upon infantile paralysis, the machine is of value in many other conditions of respiratory disorder as well. For example, it is used extensively in the United States of America for the treatment of loss of consciousness following gas poisoning and poisoning from other drugs.

A film has been made demonstrating both how the machine can be kept in order and how nurses have to deal with patients in the machine. The film is 16 mm. in size and can be had at a cost of approximately £3 from School Films Ltd., 498a, Oxford Street, London, W.1.

The respirator is delivered free at Cowley, Oxford, and transport and other charges have to be borne by the recipient. The total weight of the apparatus is just under 4 cwt. and it takes up slightly more room than a single bed. It is anticipated that deliveries will begin shortly.

It is Lord Nuffield's intention to manufacture the necessary number of 'iron lungs' and then to close down this part of his works.

POST-GRADUATE STUDY IN GREAT BRITAIN

WOMEN medical students and doctors who are planning post-graduate studies abroad are invited to correspond with the Chief Medical Officer, Women's Medical Service, Countess of Dufferin's Fund Office, Viceregal Estate, Simla (summer), Red Cross Building, New Delhi (winter), from whom advice can be obtained before leaving India about the various diplomas and courses of study available, the qualifications needed for each, and in general about facilities for residence and study abroad.

In England the services of the High Commissioner for India are available for similar advice.

Applications should be made to the High Commissioner's Education Department which is assisted in this matter, where necessary, by the Countess of Dufferin's Fund Medical Adviser in London.

Students are strongly advised not to leave India without assurance that they are qualified for admission to the examinations they intend to take.

(Sd.) G. STAPLETON,
Chief Medical Officer, W. M. S.

DR. H. DE SA SILVER JUBILEE PRIZE

THE Bombay Obstetric and Gynaecological Society has selected the following subject for the thesis for the above prize for 1939-40:—

Displacements of uterus.

The prize is open to all medical persons registered with the Bombay Medical Council and of not more than five years standing. Time to submit the thesis will be some time in March 1940.

For further particulars write to Honorary Secretaries of the Society, Empire Automobile Building, Queen's Road, Bombay, 4.

ACTION OF QUININE AND THE SYNTHETIC DRUGS ON MALARIA

(FROM 4TH GENERAL REPORT OF LEAGUE OF NATIONS MALARIA COMMISSION)

Issued by Malaria Institute of India

	ACTION ON TROPHOZOITES		ACTION ON GAMETOCYTES		ACTION ON ACUTE SYMPTOMS		Action on frequency of relapse	Action on spleno-megaly	Effect on general condition of patient
	B. T. + Q.	M. T.	B. T. + Q.	M. T.	B. T. + Q.	M. T.			
Quinine	Daily dose of 1 g. (15 grs.) causes disappearance, 5 to 7 days.	Daily dose of 1.3 g. (20 grs.) causes disappearance, 5 to 7 days.	Affects pre-gameto-cytes and gameto-cytes.	Affects pre-gameto-cytes but gameto-cytes only very slightly.	Marked action from 3rd day (2nd paroxysm).	Variable action from 3rd or 4th paroxysm.	Acts on all species but in B. T. and Q. relapse rate may reach 50 per cent.	Acts on all species but effect is transient where reinfection or relapses are frequent.	No effect if treatment is limited to number of days essential.
Atebrin	Daily dose of 0.3 g. causes disappearance, after 3 days. Effects last longer than quinine.	Daily dose of 0.3 g. causes disappearance, after 4 days in 90 per cent of cases.	Similar to quinine but slightly more marked.	Similar to quinine.	Very marked action. Fever falls by 2nd paroxysm.	Marked action. Fever usually falls by 3rd paroxysm (but with some strains effect is less than quinine).	Action slightly more than quinine especially in B. T. and certain strains of M. T.	Effect somewhat slower than quinine but seems to last longer.	Sometimes yellow coloration of skin.
Plasmochin	Slight action only.	Practically no action.	Definite action in both species.	Marked action in minimum doses of 0.02 g.	No indications for using plasmochin alone for treatment of acute attack.		Definite effect in B. T. and Q. In association with quinine and atebrin it has a marked effect in reducing relapses in all 3 species.	Insufficient data.	In the doses now used (e.g., 0.02 g.) it seems to have no depressing effect.

Notes

A.—ACTION OF COMBINATIONS OF DRUGS

1. There is no advantage in combining quinine and atebrin in treatment.
2. Quinine + plasmochin simultaneously produce less frequent and less intense toxic symptoms than atebrin + plasmochin, but are best given consecutively where possible. Quinine (15 to 20 grains daily, 7 days) + plasmochin (0.02 g. daily, 5 days*) are probably the best treatment for B. T. and Q. malaria.
3. Simultaneous administration of atebrin and plasmochin aggravates the toxicity of each and is not recommended. Consecutive treatment with atebrin (0.3 g. daily, 5 to 7 days) and plasmochin (0.02 g. daily, 5 days*) has no advantage in the primary attack, but acts on gametocytes and relapses in the same manner as quinine and plasmochin treatment.

B.—PRACTICAL SUGGESTIONS FOR TREATMENT

1. *Individual treatment.* Quinine (15 to 20 grains) or atebrin (0.3 g.) 5 to 7 days, followed by plasmochin (0.02 g.) 5 days, or quinine + plasmochin simultaneously.
2. *Treatment in field.* Quinine (15 to 20 grains) or atebrin (0.3 g.) 5 to 7 days, followed by plasmochin (0.02 g.) 5 days if funds and medical supervision are available. But if, as is usual, this is not so, short treatments with the cinchona alkaloids are more suitable.
3. *Mass drug prophylaxis.* Daily doses of quinine (0.4 g. or 6 grains), or bi-weekly doses of atebrin (0.2 g.).

*For gametocidal purposes alone, however, one dose of 0.02 g. plasmochin followed by a second dose, if necessary, on the 5th day is equally effective. It may be noted also that in one mass treatment experiment (in Sardinia), the daily administration of 0.02 g. plasmochin had to be stopped after 3 days on account of toxic symptoms.

TUBERCULOSIS ENQUIRY. INVESTIGATIONS AMONGST JUTE MILL OPERATIVES. DANGER TO CHILDREN IN OVERCROWDED HOUSES

A TUBERCULOSIS enquiry undertaken by the All-India Institute of Hygiene and Public Health, Calcutta, is in progress at the Angus Jute Mills, 23 miles from Calcutta, which employ 5,000 labourers from various parts of India. It is fortunate for the investigation that the mill possesses a good laboratory and a useful x-ray plant.

Two hundred and sixty-three workers have been selected as samples from various departments of the mill (ten in number) and put to a thorough examination including physical, sputum and blood tests, and chest skiagraphy. The previous life of the worker, the details of industrial life with age at entry, duration and nature of work, his financial status, housing and other relevant points have been recorded.

About 1.9 per cent of the workers were labelled as 'definite' cases of pulmonary tuberculosis, 5.3 per cent as 'possible' cases and 59 per cent as 'arrested' or healed lesions.

The 'batching', 'preparing' and 'spinning' departments have been taken up first and so far 1,360 workers have been tested and examined. Physical findings suggestive of pulmonary tuberculosis have been found in 48 cases. Both exaggerated tuberculosis reaction and suspicious physical findings have been detected in twelve. Bronchitis has been detected in 224, and catarrh in 49 persons.

The different processes through which the jute-fibre passes to be finally baled produce a large amount of dust. In order to determine the size and concentration of suspended dust particles, 144 samples from various departments have been examined. A majority of the dust particles were below five microns in size.

EXAMINATION OF CHILDREN

About 221 children below 15 years have been examined and followed up since last year, bringing the total to 838. Owing to the difficulty of a home survey of scattered houses and of bringing the contacts for x-ray and other investigations and to certain unavoidable difficulties about x-ray service in the hospital, the progress has not been as rapid as was expected.

It is proposed to examine completely 1,000 cases before final deductions are drawn. As soon as the homes of tuberculous patients are surveyed, a study will also be made of a certain number of homes of non-tuberculous individuals, if possible, for purposes of comparison.

In all, 110 tuberculous homes, containing 319 children, have been surveyed, of which 94 contained 'open' pulmonary tuberculosis cases. Sanitary condition was bad in 56 per cent of the houses and 39 per cent of the houses were one-room tenements. About 49 per cent of the houses contained inmates with a low economic status; the average monthly income per head being less than five rupees. Nearly 56.7 per cent of the contact children lived in houses with bad hygienic conditions and 36.6 per cent in one-room tenements.

Out of 319 children, 196 slept in the same room with the patient who was the source of infection. As the majority of cases belonged to the poor classes, no significant correlation could be found between the incidence of infection, morbidity rate and economic status.

FOURTH MAHARASHTRA AND KARNATAK MEDICAL CONFERENCE

THE joint honorary secretaries of the Fourth Maharashtra and Karnatak Medical Conference, Nasik, inform us that the fourth session of the Maharashtra and Karnatak Medical Conference will be held at Nasik on 3rd to 5th November, 1939 (both days inclusive). Dr. V. R. Khanolkar, B.Sc., M.D. (Lond.), head of the pathology department and professor of

pathology, S. G. S. Medical College, Parel, has kindly consented to preside. There will be discussions on the streptococcal infections, their bacteriology, diagnosis and treatment. All medical men are requested to attend the conference.

OPIUM SMOKING IN INDIA. HABIT DECLINING

INVESTIGATIONS on opium smoking in India have been completed at the School of Tropical Medicine, Calcutta.

It has been found that while the habit is particularly prevalent in Assam and the Central Provinces, it is met with in one form or other on a small scale in many of the large towns of India. The habit has considerably declined during the last 30 years.

The method of preparing opium for smoking, the modes of indulgence, the type of addicts have been studied. In areas where this practice is common, social and economic factors were instrumental in the spread of the habit.

The main causes of addiction have been found to be association with other addicts, disease or minor ailments, hard work, worry or strain. The dosage in a series of 300 cases studied ranged from 1 to 180 grains of opium daily.

The effects produced by the habit have been studied. The conclusions briefly are that excessive indulgence produces (1) economic loss by reducing the earning capacity of the addicts; (2) damage to health and loss of physical energy and deterioration of intellect; and (3) curtailment of longevity.

The work on the hemp drug habit in India is nearing completion.

BULLETIN OF THE HEALTH ORGANIZATION. VOL. VIII, NOS. 1-2

THIS new number of the *Bulletin* starts with the *Annual Report of the Health Organization of the League of Nations*.

Prevention and treatment of malaria, cancer, leprosy, bilharziasis and rabies; medico-social action in the sphere of rural hygiene, nutrition, housing and physical education; epidemiology and health statistics; biological standardization; campaign against narcotic drugs; unification of pharmacopœia; and anti-epidemic action in China—such are the headings of this report, the mere enumeration of which shows the wide field of action covered by the League of Nations in its work of international co-operation and in its efforts to raise the standard of health.

The second article, entitled *Health Indices*, is a skeleton standard report for use in surveys of the state of health and vitality of a given population. It contains numerical indices, incorporated in various chapters, which can be applied equally to urban or rural areas, or to a whole country, thus rendering the results numerically comparable.

Next comes the report drawn up by M. Vignerot (France) on *Rural Housing and Planning*. The first part of this article deals with the rural house and its outbuildings; the author reviews the general measures which should be taken to improve rural housing. The second part is concerned with community planning, and the third part with questions of area planning, showing the present situation and tendencies in the various countries.

The last article in this number of the *Bulletin* consists of a vast study of 260 pages drawn up by Dr. Walch-Sorgdrager on *Leptospirosis*. This comprehensive report deals with the epidemiology, clinical features and prophylaxis of leptospirosis in man and describes the various clinical forms of human leptospirosis, symptomatology, diagnosis, complications and treatment. The bibliography is the most complete one to be found on the subject.

BENGAL COUNCIL OF MEDICAL REGISTRATION

IN pursuance of section 7 of the Bengal Medical Act, VI of 1914, as amended by Bengal Act III of 1928, it is notified for general information that Lieutenant-Colonel J. C. De, M.A.C.P. (London), I.M.S., Officiating Principal, Medical College, Calcutta, has been duly elected to be a member of the Bengal Council of Medical Registration under clause (d) of section 4 of the said Act, *vice* Lieutenant-Colonel T. C. Boyd, D.P.H., I.M.S., I.M.S.

RAI SHAMBHU DAYAL SAHIB GOLD MEDAL

1. A gold medal called the 'Rai Shambhu Dayal Sahib Gold Medal' will be presented for the best prize essay on a public health subject to be announced each year.

2. The subject of the next essay is 'A Scheme for Physical Culture in Rural Areas'.

3. The competition will be open to the general public, including the medical and the public health workers in the United Provinces.

4. The essay is to be written in simple Hindi and should not exceed 3,000 words in length.

5. Essays should reach the Medical Officer In-charge, Provincial Hygiene Institute, United Provinces, Lucknow, by 15th November, 1939.

6. The name and address of the competitor must be distinctly written on each essay submitted and the envelope should have the words 'Prize Essay' in the top left-hand corner.

7. The Director of Public Health, United Provinces, shall judge the merit of the essay and his decision with regard to the award of the medal shall be final.

8. No correspondence will be entered into on the subject of the competition.

9. No essay will be returned.

MEDICINE AND THE PRESENT EMERGENCY

THE following message from members of the British medical profession has been sent to American citizens at the World Assembly for Moral Re-Armament, Golden Gate Fair, San Francisco:

'In the continuing uncertainty of world affairs, medical practitioners in common with others are deeply concerned to restore the security essential to normal living. It is vital to create confidence during an emergency, but even more urgent to prevent catastrophe and to lay the foundation of a just and lasting peace.'

'Science has made great advances, but without corresponding moral progress we risk losing even the benefits already achieved.'

'Behind much disease, as behind world unrest, are fear, self-indulgence, jealousy and resentment. These are problems for which Medicine might provide a radical solution.'

'It is still our privilege to enjoy unrivalled contact with the homes and people of the nation. Our immediate task is to teach men that health is not the mere absence of disease but includes a moral and spiritual foundation for life and the replacing of conflict and apathy with a purpose that claims the whole personality in the service of our fellows.'

'A growing body of people in many countries is calling for this "moral re-armament" to provide the discipline and the direction needed by both individual and nation. Our profession can give a lead to such a programme which is in accord with the highest ideals of our tradition. To achieve it we realize that the highest standards of honesty and unselfishness must be the touchstone of our professional and private lives. Only through insistence on these spiritual values will the resources of science be liberated and a new world built in which men can attain to their inherited capacity for physical, moral and spiritual development.'

Current Topics

Clinical Aspects of Pneumothorax Therapy as Illustrated by the Results obtained in 191 Cases of Completed Treatment*

By OLI HJALTESTED

and

KJELD TÖRNING

(Abstracted from the *British Journal of Tuberculosis*, Vol. XXXIII, January 1939, p. 4)

WITH a view to showing a statistical justification for pneumothorax therapy and to establishing the value of this therapy, the authors give an account of the late results of this treatment in 191 patients within the period 1925-31. The results are recorded under three sections: first, results in relation to the factors known at the institution of the treatment; second, in relation to the anatomical character of the pneumothorax obtained; third, correlation and comparison of the results with regard to original factors and to the subsequent phenomena occurring in the course of the treatment.

The results of the treatment according to sex, age, disposition to tuberculosis, duration of illness prior to treatment, localization of the disease, presence and size of the cavity, differ slightly as the distribution of 'good' and 'poor' pneumothorax in these groups is almost uniform. The results are distinctly favourable in unilateral cases, afebrile and sub-febrile cases and in cases with sedimentation rate under 30 in the

beginning. The late results depend on the pneumothorax obtained. Pneumothorax is generally poorer in febrile cases and it is incomplete in cases with unseverable adhesions. With ideal pneumothorax 80 to 90 per cent of the patients became well, whereas with incomplete pneumothorax the same percentage of patients died. The authors concluded that the adhesions to the chest wall should be severed by cauterization, pneumothorax once instituted should be carried out completely, and that incomplete pneumothorax should be given up and replaced by other operative treatment. In empyema, the prognosis being poor, early radical treatment is indicated.

P. K. C.

The Pathogenicity of B.C.G. after Prolonged Cultivation on Glycerinated Egg Medium

By W. H. FELDMAN

(Abstracted from the *Tubercle*, Vol. XX, March 1939, p. 253)

IT is stated by Calmette that the strain of tubercle bacilli known as B. C. G. is definitely and permanently innocuous and it is also said that to preserve its avirulent state the strain should be periodically subcultured on ox-bile-glycerinated potato medium. Attempts to increase the virulence of B. C. G. by culture were made by many workers. No evidence of increased virulence was observed by most of them. According to the author, the term 'virulence' should be distinguished from the term 'pathogenicity'. That the organism has at least a limited pathogenicity has been admitted by Calmette and demonstrated by many. The author made an attempt to increase its pathogenicity by sub-culturing the organism for fifty-

*This, and the following eight abstracts, were selected for the special tuberculosis number, but were excluded on account of lack of space.—EDITOR, I. M. G.

nine generations on glycerinated egg-yolk slants. The bacteria were then inoculated into guinea-pigs and rabbits subcutaneously, intra-peritoneally, or intravenously. The observation was extended for 453 to 455 days when the surviving animals were killed. When the animals died or were killed, they were carefully examined at necropsy. The principal organs were histologically examined and tissues were emulsified for making cultures and for inoculation of additional animals. In no instance was a progressive tuberculous disease observed. Tuberculosis-like lesions were observed in some instances, consisting of epithelioid tubercles which were frequently quiescent or atrophic. Attempts at re-inoculation by tissue emulsions of these lesions failed invariably. Thus, the findings indicate that cultivation of B. C. G. for fifty-nine generations (approximately 6 years) on glycerinated egg medium did not increase its virulence for guinea-pigs or for rabbits.

S. R. G.

A Study of the Results of Treatment of Pulmonary Tuberculosis in Mexican and White Patients

By F. R. HARPER

(Abstracted from the *American Review of Tuberculosis*, Vol. XXXVII, May 1938, p. 556)

THE form and the course of tuberculosis had been studied in 290 white and 53 Mexican patients. All these were workers on the railways. In the group of Mexican patients 66 per cent had hæmatogenic and exudative forms of disease and only 25 per cent showed a predominantly productive type of disease. As a marked contrast amongst the white group only 8 per cent were hæmatogenic and exudative, and 89 per cent were predominantly productive. Cavities were detected in 41 per cent of the Mexicans and 63 per cent of the whites. Extrathoracic tuberculosis was detected in 49 per cent of the Mexican and 20 per cent of the whites.

Regarding the results of treatment the Mexican patients did not react as well as the whites. During the course of treatment 32 per cent of the Mexicans died and in 5 years from the onset of the disease 47 per cent died. White patients, as a contrast to this, reacted much better. Only 11 per cent died during the course of treatment and 21 per cent in 5 years time.

P. K. S.

On the Frequency of Relapse after Pneumothorax Therapy in Pulmonary Tuberculosis with Cavity Formation

By SIGURD COLD

(Abstracted from the *Tubercle*, Vol. XX, April 1939, p. 301)

THE author investigated the rate of relapse in 106 patients under or after artificial-pneumothorax (A-P) treatment who have been inactive for at least one year. Renewed activity of lesions was observed in 21 or 20 per cent and tubercle bacilli were temporarily found in sputum or gastric lavage without any other signs of activity in 9 or 8.5 per cent. The time distribution of the relapses were as follows: 11 in the 1st year, 6 in the 2nd year, 3 in the 3rd year and 1 in the 8th year of observation. Thus, the risk of relapse is greatest in the 1st year but decreases rapidly. In all the 20 patients that relapsed within the first 3 years of observation A-P was being continued except in one. Hence these relapses could not have been due to early discontinuance of A-P.

Eighty-one patients have been observed for at least one year after cessation of effective A-P treatment. Amongst these, relapse was found in 3 and only transitory positive sputum in 4. It has not been possible to establish the significance of the duration of collapse with the frequency of relapse. After 3 or

4 years of inactivity, the frequency of relapse is not seen to be higher than the incidence of active tuberculosis in previously healthy persons in the same age group.

P. K. C.

The Treatment of Surgical Tuberculosis in Adults

By M. FORRESTER-BROWN

(Abstracted from the *British Journal of Tuberculosis*, Vol. XXXIII, April 1939, p. 107)

THE author considers the problem of surgical tuberculosis in adults from three aspects, namely—

(1) *Provision of facilities of treatment.*—At present such facilities are inadequate and, even where present, the after-care from the dispensaries is unsatisfactory. Thus, the desirability of establishing institutions for surgical tuberculosis cases to work in close association with orthopaedic hospitals and with proper arrangements for after-care is stressed.

(2) *Early diagnosis.*—It is very difficult on account of the absence of characteristic signs and of x-ray changes until considerable destruction of bone has already occurred, and to the fact that the patients do not seek medical advice until an abscess is formed or they are incapable of carrying on their work. The doubtful cases of 'lumbago', 'sciatica' or 'rheumatic joints' should be kept under observation in hospitals for final diagnosis and treatment.

(3) *Patient's co-operation.*—Educative propaganda should be made to produce the willingness on the part of the patients to seek early treatment. That the disease is curable and return to useful life is only possible, if treated early, should be stressed.

Provisions should also be made so that patients, when made fit can get work suited to their restricted capabilities.

P. K. C.

The Results of Phrenic Evulsion in Upper Lobe Cavitation after Six Years

By A. WILSON RUSSELL

(Abstracted from the *Tubercle*, Vol. XX, March 1939, p. 277)

THE author reports the results of a series of 50 cases in which phrenic evulsion was performed to control upper lobe cavitation and which have been followed for a period of six years. Artificial pneumothorax was primarily attempted in every case and it was effective only in 4. The immediate beneficial effect (within 3 months) of phrenic evulsion on cavities was obtained in 54 per cent or 25 cases out of the remaining 46 cases in which artificial pneumothorax was either ineffective or partially effective. As late results after an interval of six years following phrenic evulsion, 19 out of 25 immediately benefited from the operation were alive (76 per cent), only 8 out of 21 which derived no benefit were alive (38.1 per cent), and 3 out of 4 in which artificial pneumothorax was effective *per se* were alive (75 per cent), i.e., 30 out of 50 (60 per cent) were alive after six years. The author concludes that phrenic evulsion has a definite value in the control of upper lobe cavitation as a sole procedure and especially in combination with artificial pneumothorax.

P. K. C.

Über den Wert der Kollapsbehandlung bei Lungen-tuberkulose. (On the Value of Collapse Therapy in Pulmonary Tuberculosis)

By F. LOMMEL

(Abstracted from *Deutsche medizinische Wochenschrift*, Vol. LXIV, 10th June, 1938, p. 852)

THE course of pulmonary tuberculosis is very varied and it is also very difficult to estimate the value of any particular therapy. Signs and symptoms are not

so very valuable in this direction. The 'openness' or 'closedness' of a case after treatment are much more valuable data in the assessment of a case.

The author thinks that any assessment of the result of a treatment is untrustworthy if the cases are not followed for at least two years. He followed 871 cases with unilateral pneumothorax for 2 to 12 years. Amongst this group 48.7 per cent died and 51.3 per cent were still living. Of those living 12.9 per cent were diseased, 38.4 per cent were closed. After 9 to 12 years about 60 per cent were dead. This result could only be compared if similar cases without pneumothorax could be kept as controls. Raikowski compared his 138 pneumothorax cases with 76 controls where pneumothorax was indicated but was not possible for adhesions or other causes. In the group of treated cases 51 per cent died within 2 to 15 years, whereas in the untreated cases 76 per cent died in the same time. In the treated group 31 per cent were able to continue their working lives, whereas in the untreated group only 12 per cent reached this stage. Ahlenstiel gave 20 per cent better results in the treated than untreated, and Herrmann gave 43 per cent improvement in the treated and 23 per cent in the untreated. The author found the death rate in the untreated group to be 63.1 per cent and in the treated group to be 38.9 per cent. Regarding sputum findings 21 per cent became closed in the uncollapsed group and 50 per cent in the collapsed. Finally, he thinks that the comparative possibility of healing in the collapsed and non-collapsed cases are 100 to 42.

P. K. S.

Blutenzyme und Tuberkulose-abwehr. (Blood Enzymes and Resistance against Tuberculosis)

By B. SCHOLZ

(Abstracted from *Deutsche medizinische Wochenschrift*, Vol. LXIV, 11th March, 1938, p. 374)

PANTSCHENKOS thought that an effective ferment against tuberculosis might be produced by the help of an albuminous body and a vitamin. The author tried to investigate this side of the question by finding out the influence of ascorbic acid on the lypolytic ferments of human blood. He found that it raises the level of estrase and specially that of lipase. With Pantschenkos he tried to find out the utility of this method in the treatment of tuberculosis. It was thought probable that such an application of a ferment might destroy the wax covering of the tubercle bacilli, make them less resistant, more liable to chemical treatment, and diminish their multiplication.

It has been seen in animal experiments and also in observations in men that vitamin-C deficiency causes a flaring up of the disease. It has been specially noticed in the month of December, January and February when the vitamin-C containing foodstuffs are least available and tuberculosis spreads most. It, therefore, seems probable that an enzyme containing vitamin C may well be usefully employed in the treatment of tuberculosis.

P. K. S.

Zur Prognose der Tuberkulose im Säuglings- und Kleinkindesalter. (The Prognosis of Tuberculosis in Infants and Small Children)

By J. BETLE

(Abstracted from *Zeitschrift für Kinderheilkunde*, Vol. LX, 1938, p. 95)

THE reported mortality rate of tuberculosis in early childhood varies a great deal in literature. By some it is noted as high as 75 per cent and by others as low as 20 per cent. The author investigated 514 infants and small children who were treated in the children's hospital of Tolz from 1931-35. The follow-up of the

children from 1 to 8 years from the time of infection produced the following results:—

(1) Thirty-six children were infected within the first 6 months of their lives. Amongst these 25 became inactive, 1 was active, 5 died of tuberculosis, and 1 of pneumonia.

(2) Sixty-four children were infected in the age period 6 to 12 months. Amongst these 53 became inactive, 6 active, 1 died of tuberculosis and 1 of unknown cause.

(3) Forty-four children were infected in the age period 12 to 18 months. Of these 36 became inactive, 2 active, 4 died of tuberculosis and 2 of other causes.

(4) Ninety-four children were infected in the age period 18 to 24 months. Amongst these 77 became inactive, 5 active, 4 died of tuberculosis and 3 of other lung diseases.

(5) Two hundred and seventy-five were infected in the age period of 2 to 5 years. Amongst these 255 became inactive, 8 active, 2 died of tuberculosis and 2 of other causes.

Amongst all the children 27 (=5.4 per cent) died. Of these 18 (=3.6 per cent) died of tuberculosis. Sixteen died from generalized spread of whom 12 had meningitis. In one there was caseous pneumonia and in another abdominal tuberculosis.

The tuberculosis of right-sided para-tracheal glands seemed to be dangerous as in many such cases meningitis occurred.

The prognosis, therefore, is better than is given in the literature generally.

P. K. S.

Treatment of Haemorrhoids

By P. McEVEDY, F.R.C.S.

(From the *Medical Press and Circular*, Vol. CXC VII, 14th December, 1938, p. 542)

DISEASE of the venous system is common, and being progressive, eventually calls for treatment. The early symptoms are mild and painless and are generally treated with homely but futile remedies and it is not until the condition is well established that medical aid is sought. A person consulting his doctor for piles has the usual patient's confused idea that this diagnosis includes all rectal complaints; he has tried a multitude of ointments and suppositories and has failed to note the inevitable progress of the disease.

An exact and detailed diagnosis must precede treatment. Besides a general examination, this necessitates inspection of the anus, digital and proctoscopic examination. The treatment will depend on the type of piles, whether external, internal or inter-external; the stage to which they have progressed, and the presence or absence of complications.

EXTERNAL PILES

These can be seen on inspection of the anus and consist of skin tags which may contain dilated veins. These are a common cause of pruritus, are subject to attacks of inflammation and should be removed. Under local anaesthesia they are cut off with scissors level with the skin—no stitches are applied, and the wound is allowed to heal by granulation. The dressing and subsequent treatment is as described later, following operations for piles.

INTERNAL PILES

These can only be diagnosed by inspection through a proctoscope. They may be treated by palliative means, by injections or by operation. In the early stages the only symptom will be occasional slight bleeding, and the only requirement is that the patient should observe the elementary rules of life. Moderation in food and drink, regular habits in work, recreation and rest, and as little interference with the natural bowel action as possible forms the basis of treatment. Aperients, especially salines, are to be avoided, as attacks of diarrhoea aggravate piles much more than constipation. The bowels can be regulated

by a mixed diet, sufficient fluids, and, where necessary, liquid paraffin.

About 80 per cent of patients with piles can be treated by injections. The following points were emphasized by an investigation of cases treated at Ancoats Hospital: (1) The best results are obtained in men with internal piles, 60 per cent being free from symptoms after five years. (2) Women who have had children will derive only temporary improvement and when the perineum is torn there will be practically no improvement. Women who have not had children will show a 40 per cent cure for two years, but there will be less than 10 per cent of five-year cures. (3) Large fibrotic piles are obviously unsuitable as the injections only add to the fibrosis, which has already stopped the bleeding, but which increases the tendency to prolapse. (4) The more advanced stage the piles have reached, the less hope there is of a cure by injections. (5) Piles cannot be injected in the presence of complications. When a fissure is present injections would be too painful and even if the treatment is postponed until the fissure is healed the manipulations are likely to cause a recurrence. (6) When recurrence follows a course of injections a second course will likewise fail, and the period of relief will be shorter.

INJECTION TREATMENT

No special preparation is required, but the patient is advised to avoid aperients and liquid paraffin. If a small amount of faeces is present it can be displaced upwards by swabs of cotton-wool which need not be removed afterwards. Suitable instruments are essential and must be sterilized by boiling, as the solutions used are only mildly antiseptic. Down Bros. make for me a lighted speculum and needles that do not become blocked. The solution now in common use is 5 per cent carbolic acid in almond or olive oil. A few patients, especially those who have suffered from kidney disease, show an idiosyncrasy to carbolic acid, so caution is necessary in beginning the treatment and in using large injections. For the last two years at Ancoats Hospital I have used $7\frac{1}{2}$ per cent eugenol in olive or almond oil and have found it most satisfactory and non-toxic, but rather painful if given too quickly.

The injection is submucous and causes a bluish stippled swelling. If injected into the mucous membrane this becomes milky white and a superficial painless ulcer will follow. The first injection is given high anteriorly and should be 5 to 7 c.c. of the carbolic or 7 to 10 c.c. of the eugenol. The second injection a week later, of a similar amount, is given posteriorly. This injection is given a quarter of an inch above the dentate line, as, if attempted higher, the needle pierces the mucous membrane and the solution flows into the rectum. On the third occasion 3 to 4 c.c. is given on each side. Should marked improvement occur the fourth injection is postponed a few weeks, and is given right anterior and left posterior. A few weeks later the final injection is given left anterior and right posterior. Where prolapse is the predominant symptom it is important that the injection should be large, and at intervals of not longer than a week until the prolapse has ceased. In elderly patients with obstinate bleeding multiple small injections given just above the pectinate line will succeed where the usual injections have failed.

COMPLICATIONS FOLLOWING INJECTIONS

These may be due to the oil, the drug, or to faulty technique. The oil should be of the best quality, sterilized according to the B. P. formula, then filtered, otherwise the patient may develop influenza-like symptoms and be confined to bed for a few days. Failure in asepsis, using old solutions, especially if exposed to the air, or allowing water to mix with the solution, may account for similar symptoms. Some years ago we had four cases of unconsciousness in strong, healthy men following a first injection. Unconsciousness occurred rather suddenly, one to two hours after the injection, was of short duration, caused no after effects and did not occur at subsequent treatments. A rather

large dose of carbolic may have accounted for this, also for a few cases of mild transient cerebral symptoms and some that showed blood and albumin in the urine.

Pain following an injection is generally due to faulty technique, but may be due to a healed fissure having recurred after the use of an instrument. Pain follows if the injection is below the dentate line, is into the rectal muscle, or is given in such quantity or under sufficient pressure to produce necrosis. In spite of every precaution pain will occur at intervals and is possibly due to excessive thrombosis. The more the fibrosis the less the diffusion: this must be remembered at the later injections and when the treatment is repeated. Reduction of prolapsing piles must be maintained following injections, otherwise ulceration will follow. A thrombosed external pile occurring during a course of injections is probably independent of the treatment.

Primary hæmorrhage is not uncommon when the needle is withdrawn, and though slight should be stopped by swab pressure before withdrawing the speculum. Secondary hæmorrhage, which was a rare complication when 20 per cent carbolic was in common use, should not occur, and, like ischio-rectal abscess, is due to lack of asepsis or to using an excessive quantity of solution. Painful and frequent micturition may follow an anterior injection given too deeply, but this will not happen if the mucous membrane is seen to move freely with the needle.

INTERO-EXTERNAL PILES

These can be seen on inspection of the anal orifice as the varicose condition spreads down to involve the external hæmorrhoidal veins, and produces a bluish congested appearance. It is the type found commonly in women; also in males when the piles are of long standing. Occasionally a single anterior intero-external pile develops before the age of twenty, nearly always in females, and in a few years shows chronic prolapse of its mucous membrane. This pile cannot be improved by injections and must be removed by operation. Injection of intero-external piles in men may give freedom from symptoms for one to two years, or, if repeated, for as long as five years, but a permanent cure is unlikely. Unless there are contra-indications these piles are best treated by operation.

OPERATION FOR PILES

The patient is prepared by giving an enema the evening before the operation. The anæsthetic should be a low spinal or a local, and I find that, with rare exceptions, a local with adequate pre-medication is the most satisfactory, but it requires more experience than local anæsthesia for other regions. It is generally agreed that the excision and ligature operation is the one of choice, and can be used for practically all cases requiring operation. The sphincter is not stretched unless a fissure is present. Taking 12 to represent the mid-line anteriorly, the primary piles at 3, 7 and 11 should be removed with an adequate oval portion of skin, but the mucous membrane must not be stripped up above the lower edge of the internal sphincter muscle. Only the pedicle is tied, preferably with thread, no stitches are used, and undermined or redundant skin is removed. An efficient dressing is a strip of gauze, well lubricated with Amcran or Tannafax, one end of which is passed into the rectum and the rest is bunched up over the anus and maintained securely in position until next morning by elastoplast stretching from the sacrum to either side of the pubes in front. This dressing prevents primary hæmorrhage and skin edges adhering. On the second day after operation the patient commences to take liquid paraffin night and morning, and is given a mixed diet, but fruit and vegetables are avoided until after an aperient has been given on the fourth or fifth day. After the bowels have acted paraffin is taken as required, and the daily bath is resumed. Recurrence following an operation is rare and should lead to a suspicion of some degree of portal obstruction, or of gross departure from a healthy mode of life. Any

remaining pruritus is treated by scrupulous cleanliness and by rubbing in calomel powder.

It is common for treatment to be first called for when complications have developed.

Thrombosis followed by ulceration, especially of prolapsing piles, is usually found when the patient complains of an attack of piles. One or more internal piles are seen to be protruding, and may be ulcerated and surrounded by a ring of oedematous skin. Only in the first few hours should any attempt be made to reduce the piles, as later it will cause needless pain and is certain to fail. The treatment is, as for all inflammation, by rest and warmth. The patient remains in bed, hot fomentations are applied, and a hot bath is taken night and morning. Liquid paraffin is given, but aperients are avoided. Ointments and suppositories are of no therapeutic value. The inflammation subsides in a week or ten days, and in four weeks a thorough examination is made to decide the future treatment, remembering that the attack will be followed by temporary improvement.

A so-called thrombosed pile, which is really a hæmorrhage from a ruptured external hæmorrhoidal vein, is a common complication. It is almost certain to be repeated on three or four occasions until the marginal veins are obliterated. The pain is sudden in onset, occurs during defæcation or straining, lasts for about five days, and is in proportion to the size of the hæmorrhage. If seen within twenty-four hours it is

best treated by excising an ellipse of skin under local anaesthesia and extruding the clot. If seen later, it should be allowed to subside, but there is some risk of ulceration of the overlying skin or of the development of an abscess. A skin tag is a common sequela.

Intense pain, occurring each time the bowels are open and lasting a considerable time, is generally due to a fissure. It is a frequent complication of prolapsing piles or of polypi and is found in the mid-line posteriorly. A fissure associated with piles is best treated by operation, when both can be dealt with at the same time. An anterior fissure in women is frequently due to the combination of piles and a torn perineum. In such cases the fissure will not heal permanently until the perineum has first been repaired.

CONCLUSIONS

A patient with piles is suffering from a progressive disease, and drugs, ointments and suppositories cannot delay or alter its course. Palliative treatment suffices in the very early stages. Later a reasonably accurate estimate of the prognosis following injections can be given, and the severe cases can be offered a practically certain cure by operation. Complications are common in the more advanced stages and with a few exceptions must be treated before the piles. The treatment of piles is much more successful than that of diseased veins in other parts of the body.

Reviews

A HISTORY OF TROPICAL MEDICINE: BASED ON THE FITZPATRICK LECTURES—DELIVERED BEFORE THE ROYAL COLLEGE OF PHYSICIANS OF LONDON, 1937-38.—By H. Harold Scott, C.M.G., M.D., F.R.C.P. (Lond.), D.P.H., D.T.M. & H. (Camb.), F.R.S.E. Volumes I and II. Edward Arnold and Company, London. Pp. xix plus 648 in volume I and Pp. iv plus 649 to 1165 in volume II. Illustrated. Price, 50s. for two volumes

Each year it becomes more difficult to justify the separation of the study of tropical medicine from that of general medicine. There is no exact definition of a tropical disease, and the choice of which diseases shall and which shall not be considered tropical is purely arbitrary. Whilst temperature plays an important part in determining the distribution of diseases throughout the world, there are many other more important factors and the state of general sanitation is one of the most important; many diseases that are now looked upon as tropical diseases, because to-day they seldom occur outside the tropics or sub-tropics, are really only diseases of sanitariously backward countries and would disappear from the world altogether if sanitary standards of the more advanced countries were to become universal.

A history of tropical medicine is to a great extent a history of one particular phase of scientific medicine, the parasitological phase, whose most active period was from the time of Robert Koch's discovery of the tubercle bacillus to the days of the study of community nutrition, when parasitology began to fall back into its proper place in the more comprehensive science of hygiene.

A medical historian of the future might well devote a section, a large one, to 'the rise and fall of tropical medicine, from Patrick Manson to Robert McCarrison'. We believe that it will be looked upon as a great period which had very important reactions on medical science in general. It demonstrated in a most dramatic manner what could be achieved by research; its brilliant successes in the chemotherapy stirred into activity the chemist and the medical investigator in temperate climates, and its demonstration of the gross results of dietary deficiency fired the imagination of

the biochemist and physician to an intensive study of the results of minor deficiencies which is tending to dominate the medical outlook of the present day. Its decline—as a separate science—which we foretell, will be due to its own successes; in many instances life in the tropics is now as healthy as that in temperate climates and the lines of distinction between the diseases of the different zones is becoming hazier year by year. In other words its decline is no decline but a mergence into general medical science.

Whilst it may possibly be true that history is best written in retrospect, the contemporary historian has an important duty to perform, for the sake both of the present and of future generations and if the picture he paints is not such a well-balanced and well-proportioned masterpiece its details are certainly truer.

It was quite time that the history of tropical medicine was recorded and who was better qualified to do this, by virtue of his abilities as a writer and on account of his unique opportunities than Dr. H. H. Scott. Dr. Scott, who worked in the tropics for many years, has for the last 10 years been associated with the Tropical Diseases Bureau of which he is at present the director—and thereby editor of the *Tropical Diseases Bulletin*, that most useful of all publications to the worker in the tropics—and has therefore had his finger on the pulse of tropical medicine during the latter half of its most active period.

Dr. Scott traces the beginnings of tropical medicine to a period much earlier than we have suggested and gives numerous extracts from some of the earliest writers. These contain apparent flashes of intuition, the results of accurate epidemiological observations which, though ignored or forgotten in the early days of the parasitological era, are now explainable, but for the most part these writings provide amusing reading. Dr. Scott, however, warns us that our beliefs and theories may appear equally absurd to subsequent generations of readers. Perhaps the characteristic feature of these early writings, such as those of Chisholm, is their dogmatic statements which obviously rest on the barest basis of experience on the part of the writer, which experience he seldom troubles to quote, and the fantastic theories which are not usually

expressed as theories but as facts. Though our deductions may appear ridiculous to future generations, surely our data will be of some value, if in the morass of modern literature it will be possible to find them.

The author describes the parts played by the services, the colonies, and India in the development of tropical medicine, in separate chapters, and then takes up the more important diseases one at a time. As regards space allotment malaria and yellow fever divide the honours with a hundred and sixty odd pages each. The last four chapters are on the Suez canal, the Panama canal, the slave trade and disease, and finally a series of brief biographies of 15 outstanding figures in tropical medicine, from Garcia da Orta (1490) to Ronald Ross (1857 to 1932). There is a select bibliography in which books only are included, an authors' index (which allows tropical workers to decide immediately if the book is a good one or not!) and a comprehensive subject index.

We awaited this work impatiently and with high hopes, and we were not disappointed. The history of medicine is infinitely enriched by the addition of these two volumes.

TEXTBOOK OF MEDICAL TREATMENT.—By Various Authors. Edited by D. M. Dunlop, B.A. (Oxon.), M.D., F.R.C.P. (Edin.), L. S. P. Davidson, B.A. (Camb.), M.D., F.R.C.P. (Edin.), M.R.C.P. (Lond.), J. W. McNee, D.S.O., D.Sc., M.D. (Glas.), F.R.C.P. (Lond.). 1939. E. and S. Livingstone, Edinburgh. Pp. xx plus 1127. Illustrated. Obtainable from Butterworth and Company (India), Limited, Calcutta. Price, Rs. 16-12

To add another book to the already overcrowded medical library is undertaking a grave responsibility. The reasons for the editors' decision to undertake this work are given in the preface. These include a general criticism of textbooks on medicine, which is unfortunately as true as any general criticism can be; this is, in the main, that useless or obsolete forms of treatment are copied from textbook to textbook, that when more than one form of treatment is mentioned there is no indication as to what should influence the practitioner's choice, and that these books abound with vague statements, such as 'vaccines may be tried'. Further, they consider that the space allotted to treatment in textbooks is usually inadequate. With a group of very able and practical contributors the editors have set forth to put matters right, and we have no hesitation in saying that they have to a great extent succeeded.

The subject-matter is divided into the following chapters:—Infectious diseases; septicæmia and erysipelas; tuberculosis; common diseases of the skin; venereal disease; common tropical diseases and helminthic infections; some common disorders in infancy and early childhood; industrial diseases; metabolic diseases—diabetes, obesity; deficiency diseases; diseases of the ductless glands—thyroid; suprarenals, etc.—diseases of the blood, spleen and lymphatic glands; diseases of the alimentary canal; diseases of the liver, gall-bladder and biliary tract, pancreas and peritoneum; diseases of the heart and circulation; diseases of the blood vessels and limbs; diseases of the nose, throat and ear; diseases of the respiratory system; renal diseases; chronic rheumatic diseases and diseases of bone; diseases of the nervous system; psychotherapy in general practice; technical procedures and oxygen therapy.

Each chapter is written by an individual or more often two contributors. The quality of the contributors is even and, in the chapters we selected for special study, the principles laid down in the preface have been observed and the faults which were noted as occurring in other textbooks, as far as possible, avoided. However, the expression 'may be tried' did appear occasionally.

The chapter on tropical diseases is left in the experienced hands of Colonel Greig. Most of the treatment he advocates is sound and up to date, an exception being that he gives preference to thymol in the treatment of ancylostomiasis, for the very poor reason that a

particular worker who has had considerable experience in the treatment of this infection considers it the best treatment. He does not mention that this particular worker retired from the tropics 20 years ago, and has obstinately refused to see that since his day more effective, more safely-administered, and cheaper drugs have been introduced.

In the section on anaemia Professors Davidson and Fullerton naturally start with a classification: this is the classification that recent work on the subject has indicated and it certainly simplifies treatment. The subject is dealt with thoroughly but never redundantly in about 70 pages.

It is a book that we can strongly recommend to the practitioner in this country. The price is reasonable, and both quantitatively and qualitatively very good value for the money.

TREATMENT OF SOME COMMON DISEASES (MEDICAL AND SURGICAL).—By Various Authors. Edited by T. Rowland Hill, M.D. (Lond.), M.R.C.P. (Lond.). 1939. E. and S. Livingstone, Edinburgh. Pp. xv plus 398 with 90 illustrations, including several in colour, and many x-rays. Price, 15s. Postage, 6d.

THE conception of this book was a very pretty idea; all the contributors are members of the honorary staff of the Southend General Hospital. If its publication serves as another bond of harmonious union between these heterogeneous London (mostly) consultants, the book will at least have served one good purpose. Perhaps, if we say that we don't think very much of it and that the medical bookshelf would have been less overcrowded, but otherwise little poorer, had this book never been published, we can provide them with another common cause. It is a book that supplies no particular want, and fits into no place in one's library. Any two numbers of a medical paper such as the *Practitioner* will give one as good a selection of articles as appear in this book, with the added advantages that they have been subjected to experienced and masterly editorship and that should you want to refer to them again you know where to look for them.

The editor's apology in the preface is unconvincing, as well as being curiously expressed.—'Books devoted to the description of modern methods of treatment and designed for the general practitioner have shown a tendency rapidly to multiply in the last few years'. (It is better to deliberately split an infinitive than to avoid clumsily splitting one, as Fowler might have said.) 'We have felt that many of these volumes, unquestionably meritorious and valuable, have been forced to compress much subject-matter into a restricted compass.' And into one chapter of 23 slender pages, he himself (or should we blame the volume) then attempts to compress the whole subject of anaemia—classification, symptomatology, and treatment—and he doesn't hesitate to include such rare diseases as Albers-Schöberg's, Niemann-Pick's and Hand-Schüller-Christian's in his scope.

The book contains a number of articles that are 'unquestionably meritorious and valuable'.

MEDICAL TREATMENT IN GENERAL PRACTICE WITH RECENT ADVANCES.—By D. R. Dhar, M.B., D.T.M. (Cal.), M.R.C.P. (Lond.). 1939. Published by Monica Dhar, 36, Chowringhee Road, Calcutta. Pp. xiii plus 596. Price, Rs. 10-8 (Indian) or 22s. 6d. (Foreign). Obtainable from D. M. Library, 42, Cornwallis Street, Calcutta

In his excellent foreword to this book Colonel R. N. Chopra writes 'The greater part of the space in books on medicine is generally devoted to the description of the aetiology, diagnosis and symptomatology of a disease and the treatment is only perfunctorily dealt with. A complete modern treatise on treatment, keeping in view the conditions existing in India, is yet to be written. The general practitioner has, therefore, always felt the want of a book dealing adequately with treatment, and this book is intended to supply the want'.

He adds, 'the inclusion of Indian preparations in the description of the diet given by this author should greatly appeal to medical practitioners, particularly in Bengal'.

In this book of nearly 600 large pages, about 90 per cent of the space is devoted to treatment. The writer has displayed his vast knowledge of recent medical literature and has provided for the student and practitioner a mine of information on medical treatment.

Cholera, for example, is given 27 pages and 24 of these are on the subject of treatment. Comparing this with other books that the reviewer happens to have in his desk, he finds that a textbook on general medicine of 1200 pages devotes 3 page to the treatment of cholera, and two standard books on tropical medicine four and nine pages, respectively. So that the author's claim that he lays special emphasis on the most important aspect of medicine, namely treatment, is fully justified.

We have, however, a few criticisms. The author suffers from the besetting weakness of Indian practitioners and teachers, a weakness, let us add, which many have entirely overcome; he does not correlate theory and practice, and he does not really believe a great deal of what he reads and teaches. He quotes the remark that 'the introduction of the full diet in the therapeutics of typhoid fever is the greatest contribution of all time toward the control of the malady'. What he himself says about diet is 'During the height of the fever the patient does not like to take any food except liquids. Glucose water, butter milk, fruit juice, drinks sweetened by lactose, may be given in four to eight ounces every two to three hours. Though the usual requirement of about 3,000 calories for an average young adult during the febrile stage can not be kept up [sic] here, yet for all practical purposes if given only *plenty of liquids* at the height of the fever even with extreme loss of appetite, the patients do well'. Then his conscience pricks him and he adds 'But during the early or later stages with some desire for food yet left, besides milk sweetened with glucose, one can easily give boiled smashed potatoes, with half-boiled egg or milk, or broth or soups. Boiled soft rice with milk and egg in the form of a pudding is a very palatable form of diet liked by most young patients'. He becomes even more bold and adds boiled fish and soft bread and butter. He however repeatedly gives warnings, such as, 'care should be taken to see that too much diet is not given, as this may conduce to diarrhoea'. The net result is probably that his patients get about 600 calories during the 'height of the fever' which may be for three or four weeks. He may be quite right, but if he believes in the low-calorie diet why not say 'the modern teaching about a high-calorie diet is not applicable in this country and I don't believe in it'.

We are frankly disappointed in his paragraphs on dietary suitable for Indian subjects. Most of them might have been taken directly from English or American textbooks with the occasional addition of an Indian fruit.

Wasn't it Lord Fisher who said 'Never withdraw, never apologize'? We might add another dictum 'Never print an *errata* slip'. It does no good to draw the attention of the reader to the fact that you have discovered, or someone else has pointed out to you, that 'metallic' is not spelt 'metalic', or that the printer has dropped an 'l' out of flatulence, or inserted an 'n' in 'exposure', especially when there are similar mistakes on every page.

However, we repeat, the book is a mine of information on the subject of medical treatment.

THE RELIEF OF PAIN: A HANDBOOK OF MODERN ANALGESIA.—By H. Balme, M.D. (Durh.), F.R.C.S. (Eng.), D.P.H. (Lond.). 1939. Second Edition. J. and A. Churchill, Limited, London. Pp. xvi plus 399. Price, 12s. 6d.

PAIN is the dominant symptom for which a large number of patients seek medical aid, and the problem of relief of pain due to various ailments is constantly

before the medical practitioner. The book under review is meant to help the practitioner in alleviation of pain of the suffering patient.

The book is divided into four parts: I. The problem of pain, II. General and systemic pain, III. Regional pain, and IV. The therapeutics of analgesia. The author has discussed the question as to what pain really is, its physiology, the physical phenomena associated with pain, its varieties, and then how an investigation of a painful affection should be carried out. The author has emphasized the importance of a thorough investigation, apart from which no satisfactory or scientific relief can ever be devised. He has next considered how the different diseases that give rise to general and systemic, or regional, pain have to be treated, particularly from the point of view of relief. Each section has been dealt with in adequate detail and in an eminently practical way. The chapter on prevention of pain stresses how we can and should examine and handle injured tissue, set fractures, dress painful wounds, and conduct such minor surgical procedures, painlessly. This chapter should be read by every young dresser, casualty officer, and general practitioner. The last part of the book deals with the therapeutics of analgesia, the different physiotherapeutic measures and analgesic drugs that are employed for relief of pain.

The book is admirably written and its popularity is apparent from the fact that it has reached the second edition within two years and a half of its first publication. The book will be found useful by general practitioners and specialists alike.

P. C. S. G.

ANÆMIA IN PRACTICE: PERNICIOUS ANÆMIA.—

By W. P. Murphy, A.B., M.D. 1939. W. B. Saunders Company, Philadelphia and London. Pp. 344. Illustrated. Price, 22s. 6d.

THIRTEEN YEARS ago, Drs. G. R. Minot and W. P. Murphy published a paper in the *Journal of the American Medical Association* describing the effect of liver diet in pernicious anæmia. This was a clinical study, but the results were striking enough to attract a considerable amount of attention, not only of clinicians but of laboratory workers as well. The immediate direct result was a revolutionary change in the treatment of pernicious anæmia with a very great improvement in the prospects of the pernicious anæmia patient, and an even more important indirect result has been a great revival in the study of hæmatology which has led to a more rational classification of the anæmias and to a much better understanding of disorders of the blood, generally.

Dr. Murphy has decided to present his knowledge on this important subject in book form, and a book by so distinguished an author on the subject in which he has made his name cannot be ignored.

Our main criticism of this book is of its title; this is either meaningless or misleading. It seems either to imply that the anæmia one encounters in practice is always pernicious anæmia, which is absurd, or it suggests that the book is a general one on anæmia in practice, including pernicious anæmia, which it is not. Actually, it is a book on pernicious anæmia with a few introductory chapters on anæmia in general. Four-fifths of the book are devoted to pernicious anæmia, the remaining fifth is divided between hypochromic anæmia and normocytic anæmia; tropical macrocytic anæmia has found no place in the book and the section headed 'nutritional anæmia' refers to the anæmias of scurvy, of thyroxin deficiency, and of general starvation only.

The clinical chapters on pernicious anæmia are good and one must listen with respect to the teaching of a pioneer in the present-day liver treatment of this disease.

In this country where the disease is rare, only to those who take an academic interest in pernicious anæmia can we recommend this book,

THE HEART SOUNDS IN NORMAL AND PATHOLOGICAL CONDITIONS.—By O. Orlas, M.D., and E. Braun-Menendez, M.D. 1939. Oxford University Press, London and New York. Pp. xx plus 258. Illustrated. Price, 15s. Obtainable from Oxford University Press, Bombay and Calcutta

INVENTION and perfection of different instruments of precision such as the stethoscope, the sphygmomanometer, the electro-cardiograph, the orthocardiograph, etc., have been landmarks in the path of progress of cardiology. Each invention has given an impetus to further study that has led to important contributions to the subject. The phonocardiograph, the most recent of the instruments of precision, provides the means of obtaining a faithful graphic record of heart sounds.

This excellent monograph tells us all about the valuable results that have been obtained with the phonocardiographic method of exploration of heart sounds.

The book is divided into three parts: the first being the general introduction and methods of studying the sounds, the second deals with the heart sounds in normal conditions, and the third with the heart sounds in pathological conditions. In the first part, the authors have described the gradual evolution of knowledge of heart sounds; when it was first recognized, how its presence was first denied and how with the advance of knowledge the denial came to be regarded as 'a shameful testament of human stupidity', and finally how the art of auscultation of heart sounds was developed by the masters like Laënnec, Potain, Huchard, Skoda and others. Gradual development of the methods of graphically recording the heart sounds has been described and the subject of heart sounds, its physical and physiological aspects have been discussed in considerable detail. The technical details of phonocardiography have been fully described. The chapters dealing with the normal heart sounds show the result of analysis of heart sounds by the phonocardiograph. The different components that make up the sounds have been identified and their characteristics fully studied.

The character and mode of causation of the third heart sound and the auricular sounds have been demonstrated. In the chapter dealing with the heart sounds in pathological conditions, the graphical records of the heart sounds in the different valvular diseases, pericarditis and other cardiovascular abnormalities have been demonstrated. Phonocardiographic studies of the subject of gallop rhythm has yielded valuable results and the different modes of production of gallop rhythm have been clearly demonstrated.

The limitations of auscultation as a means of investigation are generally admitted. The graphic method of registration has not only provided us with means of objective and quantitative analysis of heart sounds, but it has definitely led to considerable advance in the knowledge of heart sounds in normal and pathological states.

The authors have studied the heart sounds graphically for a number of years and have made valuable contributions to the subject. Their monograph is an admirable exposition of this relatively new branch of cardiology.

The illustrations and graphical records are excellent: the latter represent the result of a perfect technique arrived at by years of painstaking research.

The book should be in the library of every cardiologist.

P. C. S. G.

CARBON MONOXIDE ASPHYXIA.—By Cecil K. Drinker, M.D., D.Sc. 1938. Oxford University Press, London and New York. Pp. xx plus 276, with 40 figures and 21 tables. Price, 25s. Obtainable from Oxford University Press, Bombay and Calcutta

THIS is a monograph written for the benefit of those who have to face the various risks associated with carbon monoxide asphyxia, especially in connection with industrial concerns. As man is progressing with civilization he has to invent newer and better machines

for the amenities of modern life some of which are not without their attendant evils. The writer, as a practical man, does not condemn these modern advances because they are associated with some risk to life, but has tried to cope with the hazards when they arise and to minimize their incidence as far as practicable. He states that 'there would no doubt be some 40,000 fewer deaths per year in the United States if automobiles were prohibited and we went back to the horse-drawn age', but such a wholesale restrictive measure would only serve as a retrograde step and would not solve the problem in practical life. It is the duty of modern man, the author opines, to learn to control the danger, but not to abandon the machine. The use of gas, of gasoline, of oil and of coal is part of the daily life in modern civilization throughout the whole world, and carbon monoxide is the companion of the use of all of these. As this use cannot be abandoned, Professor Drinker tells us in this monograph how best we can avoid the dangers and cope with abnormal situations when they have arisen.

The writer has begun with a discussion of the physiology of respiration as it is affected in carbon monoxide asphyxia. In the next two chapters, the effects of the noxious gas on the different organs of the body and the symptoms and signs of poisoning are described in detail. The common sources of carbon monoxide as found in cases of poisoning have been mentioned and some statistics on the subject have been given. One finds a good deal of interesting and useful information under this heading. For instance, very few of us know the large number of fatal accidents due to inhalation of exhaust gases from automobiles and from gas heaters and gas leaks. In our tropical climate this is not very dangerous but in temperate climates where there is no adequate ventilation the risk is indeed enormous. The pathology of the condition has been discussed in detail after which comes the signs and symptoms of chronic poisoning. In this connection the writer suggests that a physician should always bear in mind the probability of chronic carbon monoxide poisoning whenever he encounters mysterious conditions of ill health in a group of persons all subjected to the same environment. In discussing the treatment of the condition, the author considers that the most important factor for lessening the incidence of the danger is the education and propaganda work by intelligent inspectors. In acute poisoning, early resort to artificial respiration and inhalation of a mixture of 93 per cent oxygen and 7 per cent carbon dioxide are the sheet-anchor. The author has also very ably deprecated the use of drugs and particularly the use of blood transfusion in a case of acute carbon monoxide asphyxia. The last chapter which has been written by Dr. Julius Sendroy, the Professor of Chemistry of the Loyola University, Boston, Mass., contains a complete and useful survey of the methods of analysis commonly employed for the detection and estimation of carbon monoxide in air and in the body fluids. An exhaustive bibliography will be found invaluable to those who are interested in the subject.

Professor Drinker with his vast experience and painstaking study has written the subject-matter in such an authoritative manner that the reviewer regrets he cannot find points for criticism. But there are three points to which the writer's attention may be drawn. The first is in connection with the arrangement of some of the chapters. After describing the symptoms of acute poisoning, the reader is suddenly diverted to what constitutes harmful exposure, sources of the gas and the pathology, after which the chronic poisoning has been taken up. Moreover, after discussing the effects of carbon monoxide on the different tissues of the body in the second chapter, the author has gone on to reiterate the same facts in the chapter on pathology. There is certainly an opportunity for rearrangement and modification of the material. The second point relates to the language. In some places, the language used by the writer is so unorthodox in nature that even a reader with great patience and forbearance will feel it difficult to persevere with his above virtue. A few examples will suffice; 'The

patient has gotten into an equilibrium'; 'of the individual who has been downed abruptly'; 'the legs began to become oedematous'; 'this carbon dioxide-rich blood', etc., etc. The last but not the least important point is the cost. A book of 276 pages, with a few line drawings only, and printed in the most usual way, on carbon monoxide asphyxia costs 25 shillings! Few readers will be able to afford this high price.

The book is undoubtedly a very good one and we commend it to engineers, insurance people, men handling compensation for accidents, safety directors and teachers of safety, lawyers and employees of utility companies. They will find in this book answers to many riddles without making the answers more confusing than the riddles.

M. N. D.

SEX AND INTERNAL SECRETIONS: A SURVEY OF RECENT RESEARCH.—Edited by Edgar Allen. Second Edition. 1939. Baillière, Tindall and Cox, London. Pp. xxxvi plus 1346. Illustrated. Price, 54s.

Endocrinology is a subject which has been making gradual advance for some time past; recently, however, the advance has been made with such speed, and the data accumulated therefrom have been brought to light with such bewildering rapidity that increasing difficulty was felt in evaluating some of the conflicting evidence which had gathered round the subject. With the object of surveying the progress of research on the problem of sex and internal secretions, the Bureau of Social Hygiene, New Haven, Connecticut, initiated a systematic programme of research on the fundamental problems of sex, under the administrative guidance and the team work of a committee appointed by the National Research Council, under the able editorship of Dr. Edgar Allen. The present volume, which appears to be an eminently useful and exhaustive survey and digest on the subject of the relations of the internal secretions to the phenomena of sex and reproduction, is the second edition which has followed in the wake of its predecessor in a thoroughly revised form within a period of five years. This revision was essential, especially in view of the fact that endocrinology of the sex function has been enriched by new experimental evidence, particularly in the biochemistry of the male and female hormones.

The book is primarily intended for those who are either interested or actually engaged in research work in the intricate problems of sex endocrinology. It is by no means a treatise intended to give general information on sex problems and hence, for a thorough understanding of the technical nature of the subject-matter of the book, a fair amount of biological background is necessary, particularly in embryology. The book deals with the most important recent researches on the problems of sex and as such will prove valuable to those who are engaged in investigations thereon or to those who are casting about for promising problems for investigation.

The book is divided into five major sections, each of which is again sub-divided. The contributors form a group of authors, each of whom has written on his own chosen field of interest.

The first section of the book deals with the biological basis of sex and includes sub-sections on the embryonic development of sex, modification of development of sex in lower vertebrates and in mammals, relation of genic and endocrine factors in sex, etc. The next section deals with the physiology of sex glands, germ cells and accessory glands and includes sub-sections on the biology of the testes, endocrine functions of the ovaries, some of the endocrine functions in pregnancy, etc. The next section, a highly important one from the point of view of the recent researches on sex problems, deals with the biochemistry and bioassay of androgens, oestrogenic compounds, corpus luteum progesterone, etc. The section which follows deals with the hypophysis and the gonadotropic hormones of blood and urine in relation to the reproductive system. It deals with such problems as the effect of the pituitary on the

gonads, the follicle stimulating and luteinizing hormones of the anterior pituitary, etc. The last section of the book deals with additional factors in sex functions and endocrine applications in man such as the relation of the thymus and pineal glands to the genital function, the relation of the vitamins to the sex glands, the sex drive and the sex functions in man.

The book gives a fairly exhaustive account of the scientific foundation on which our present knowledge of sex glands has been built up. The addition of an exhaustive bibliography at the end of each of the sub-sections of the book is a special feature and will be an invaluable guide to those who wish to amplify their knowledge on the subject. We have no hesitation in saying that the book is a valuable contribution to our knowledge on the subject and should prove to be a standard book of reference to those engaged in the problems of sex and internal secretions.

J. P. B.

PICTORIAL MIDWIFERY: AN ATLAS OF MIDWIFERY FOR PUPIL MIDWIVES.—By Sir C. Borkoley, M.A., M.C., M.D. (Cantab.), F.R.C.P. (Lond.), F.R.C.S. (Eng.), Hon. M.M.S.A., F.C.O.G. Third Edition. 1939. Baillière, Tindall and Cox, London. Pp. xii plus 166. Price, 7s. 6d.

In this third edition some new figures have been added and others deleted. The main new feature is the coloured illustration of the foetal circulation. This is a welcome addition and the use of colour has certainly simplified the subject, but we have seen black and white sections of the placenta which are easier to follow than the coloured one shown here.

This book will prove as useful to the medical student as to the student midwife and we can strongly recommend it to both, as well as to those who have to teach them.

CÆSAREAN SECTION—LOWER SEGMENT OPERATION.—By C. McIntosh Marshall, F.R.C.S. (Eng.). 1939. John Wright and Sons, Limited, Bristol. Pp. vii plus 230 with 2 plates and 107 illustrations. Price, 21s.

THIS little book is concerned entirely with the lower uterine segment operation of Cæsarean section. It starts with an interesting historical account of the evolution of Cæsarean section, and all the various operations connected with this procedure are enumerated.

However, as is natural in this book, it is the lower segment operation which is the only one described in detail.

The operation is reviewed from every angle, and the description is supported with a complete statistical list of the results of the author's own cases, and an extensive research into contemporary literature.

The author is to be congratulated on the extreme clearness with which he has described the operation, and for the wealth of excellent diagrams which makes it possible for the reader to follow every step with ease.

The indications for adopting the lower segment operation and the contra-indications to this choice together with its dangers and difficulties are well described and wise advice is given. Not the least interesting chapter is that which is devoted to the choice of the anaesthetic, the advantages and disadvantages of all the common anaesthetics being weighed in the balance, with the result that Mr. Marshall favours spinal anaesthesia as his first choice, and local sometimes re-inforced with ether or gas and oxygen as his second. In his experience, ether, chloroform, or the A. C. E. mixture tend to cause excessive hæmorrhage as they relax the uterus.

We suggest that this little book should be on the shelves of every specialist in obstetrics.

MENSTRUAL DISORDERS: PATHOLOGY, DIAGNOSIS, AND TREATMENT.—By C. Frederic Fluhman, B.A., M.D., C.M. 1939. W. B. Saunders Company, Philadelphia and London. Pp. 329. Illustrated. Price, 22s. 6d.

ALL practitioners who have to treat gynaecological cases will find this work by Professor Fluhman to be of much value and interest.

The author deals with that important, and often most trying, physiological process of menstruation from every angle—historical, normal, pathological, diagnostic, and therapeutic.

The information is right up to date and gives the present conception of female sex hormonology which, though still largely in experimental stages, has an undoubted therapeutic future and which must be studied by all who treat women's ailments.

The book is well bound, agreeably printed, has a large number of clear photomicrographs, and useful diagrams. At the end of each chapter, there is an ample list of references to other works.

This is a volume which will repay study and which will throw much light for the practitioner on a considerable, and often difficult, branch of gynaecology—menstruation and all its disorders.

K. S. F.

A TEXTBOOK OF SURGERY.—By American authors. Edited by Frederick Christopher, B.S., M.D., F.A.C.S. Second Edition. 1939. W. B. Saunders Company, Philadelphia and London. Pp. xxiv plus 1695. Illustrated. Price, 42s.

THIS interesting book, though arranged in the form of a textbook, really consists of a collection of papers by American surgeons, purporting to cover the whole field of general surgery.

The 1695 pages of text are shared by no less than 188 writers, of whom a few have contributed less than two thousand words each.

No doubt this is what makes the book so attractive; every section has an air of freshness, and every writer has taken pains to present the latest ideas to be found in the literature—or at least in the American literature.

Where so many excellent features are to be found it is unprofitable to make a thorough commentary on any one section. But the portions devoted to orthopaedics, diseases of bone, and allied subjects deserve special praise. The conditions under which man lives and works to-day have given rise to numerous new pathological conditions, especially in the skeletal system, and the student will find all the important ones described in this book.

While heartily recommending the book to the medical profession, its suitability for the undergraduate student is open to question, because the very features which make it so brilliant tend to detract from its value as a book of reference for candidates for the qualifying examinations. There is a wide variety of style and method of presentation; a lack of collaboration and synopsis which makes the text indigestible. Some contributors give dozens of references to the literature, while some—more merciful—give none. Some sections are prefaced by anatomy, and some are not; and in several sections the clinical and pathological descriptions are skimmed in order to present some new fad of surgical technique. But these are but slight roughnesses which are sure to be smoothed out in future revisions; and the second edition, which is now presented, should go far to enhance the good reputation the book has already earned.

W. McN. N.

TEXTBOOK OF GENERAL SURGERY.—By W. H. Cole, M.D., F.A.C.S., and R. Eiman, M.D. Second Edition. 1939. D. Appleton-Century Company, Incorporated, London. Pp. xxviii plus 1031. Illustrated. Price, 40s.

THIS is the second edition of a textbook for students, the subject-matter of which is based on the courses of lectures on surgery delivered at the Washington University School of Medicine. On this foundation

the authors have built a thoroughly well-balanced and readable book.

There have been numerous minor revisions and additions in the new edition, directed chiefly towards keeping the text abreast of recent advances in surgery. They will be of more value to the 'advanced' than to the 'elementary' student; and incidentally one supposes that it is for the benefit of the former that such exhaustive bibliographies adorn certain sections.

The book is arranged along the usual lines; a number of chapters on pathology, bacteriology, technique and the like precede the chapters on regional surgery. The text is interspersed with many good illustrations, of which the photomicrographs and skiagrams are exceptionally fine.

Students and practitioners desiring a sound and comprehensive surgical textbook at a moderate price would do well to give this book their close attention when making their choice.

W. McN. N.

THE CLINICAL DIAGNOSIS OF SWELLINGS.—By C. E. Corrigan, B.A., M.D., F.R.C.S. (Eng.). 1939. Baillière, Tindall and Cox, London. Pp. viii plus 313. Illustrated. Price, 18s.

THIS is one more book dealing with the elicitation of physical signs in clinical surgery but it is restricted to the investigation of swellings. As there is no dearth of excellent handbooks on the subject, doubts may be expressed about the necessity of another book of 313 pages. The author explains that it is intended to be used as a 'companion to clinical practice' rather than as a textbook to prepare one for clinical encounters.

There are twenty-six chapters in this book, dealing firstly with general considerations and finally with the different regional swellings. This is a good book and the principle which is followed is commendable. 'Direct your questions to the swellings themselves, rather than to the patient, and the answers received will be more concise, less circumstantial and more dependable.'

The printing, get-up and illustrations are of the usual standard. The reproduction of photographs has been eschewed in favour of line drawings which, the author claims, serve the more desirable purpose of translating clinical manifestations into terms of anatomy and pathology. A useful index is appended. The insertion of brief biographical notes at the end of each chapter adds to the value of the book.

P. N. R.

INFECTIONS OF THE HAND.—By L. R. Fifield, F.R.C.S. (Eng.). Second Edition by P. Clarkson, F.R.C.S. (Eng.). 1939. H. K. Lewis and Company, Limited, London. Pp. xii plus 167 with 57 illustrations, including 8 plates (2 coloured). Price, 9s.

THE second edition of Fifield's *Infections of the Hand* is sure to receive the same welcome which was meted out to its predecessor. Mr. Clarkson, in editing a popular book, has done his work well. Every chapter has been practically re-written and special chapters have been added on the treatment of wounds of the hand, on special infections and on insurance aspects and prognosis.

In the treatment of infections, chemotherapy rightly deserves special mention. Of the sulphanilamide derivatives, only M. and B. 693 has been mentioned. This drug appears to be of particular efficacy in pneumococcal infections, but it is certainly not the most potent medicine in streptococcal infections. Prontosil red, the original preparation, is still supreme in its therapeutic effect in cases of streptococcal infection, particularly of the haemolytic type. There is no justification for the deliberate omission of the name of Prontosil.

The printing, get-up and illustrations are all very good. There is also a useful index.

P. N. R.

RELATION OF TRAUMA TO NEW GROWTHS: MEDICO-LEGAL ASPECTS.—By R. J. Bohan, M.D., Dr. Mod. (Borlin), F.A.C.S. 1939. Ballière, Tindall and Cox, London. Pp. xii plus 425. Price, 22s. 6d.

The rôle of an expert medical witness is at all times an unenviable one; it is particularly so when he is faced with the vexed question of the traumatic origin and development of new growths. Dr. Bohan has done a great service by writing this monograph which it is confidently expected will be of value not merely to the medical practitioner, but also to judges and lawyers in cases of litigation over compensation.

There are, altogether, thirty chapters in this book presenting a complete account of the subject with citations of leading cases and judgments. Many judicial opinions have been rendered in favour of the concept that trauma is an important causative factor in the origin of new growths. It is also frequently essential for the court to determine if the injury received was instrumental in the development of metastasis. The definition of trauma, from the medico-legal aspect, is not so easy as it seems. Current medical opinion concerning the effect of chronic irritation, single trauma, indirect injury and occupation cannot be said to have been sufficiently crystallized. Regarding the incidence of occupational carcinoma, the Federal Minister of Labour in Germany, commissioned Professor Dr. Otto Teutschlaender, of the Institute for Experimental Cancer Research in Heidelberg, to investigate the problem of occupational cancer. He suggested that the disability due to cancer resulting from trauma or irritation in workers while engaged in their usual occupations are to be classified under 'hazards of industry' and should be held equally compensatory with the disabilities due to injuries. The chimney sweepers' cancer is diminishing, but the incidence of carcinoma amongst aniline and tar workers, mule-spinners, shale-oil workers, and others, is certainly on the increase.

In a critical review Kolodny stated that there 'is strong evidence to support the view that in general, trauma may lead under certain predisposing conditions to osteogenic sarcoma', but the time interval as a factor varies considerably. In the case *Greeby vs. Phila Asbestos Co. et al.*, osteo-sarcoma of the femur was alleged to have followed injury, and compensation was awarded. The relationship of mammary carcinoma to trauma, the result of a blow, seems to have been placed on a legal 'cause and effect' basis by Handley in his report of a 'legally established case of traumatic carcinoma of the breast' (*Practitioner*, Dec. 1934). It is, however, to be regretted that legal opinion, as voiced in court decisions, while they add to established precedent, do not contribute to medical knowledge (Knox).

The printing and get-up of this book are very good, but there are many printing mistakes. The book is written in simple and elegant English but there are expressions with which we are not familiar; carcinoma of the male breast is said to be frequently produced by the 'constant irritation of a suspender* buckle riding over the nipple'. Nevertheless, we have much pleasure in recommending this book, which is likely to fill a long-felt want.

P. N. R.

AN INTRODUCTION TO CLINICAL PERIMETRY.—By H. M. Traquair, M.D., F.R.C.S. (Ed.). Third Edition. 1938. Henry Kimpton, London. Pp. xv plus 320 with 227 illustrations and 3 coloured plates. Price, 30s.

This is the third edition of this classical work by Dr. Traquair and makes a very welcome appearance. The procedure described in his method of visual field testing is both easy and satisfactory and known as the quantitative method of perimetry. This is essentially

[*Our reviewer has evidently had an English and not an American education. In America 'braces' are 'suspenders', and 'suspenders' are 'garters'.—EDITOR, I. M. G.]

associated with the name of Bjerrum who discovered that he could obtain more information by using the back of his consulting-room door than he could from the ordinary perimeter. This method has also been extensively used by Roenne who has demonstrated its value in the diagnosis of all ocular diseases in which perimetry is helpful.

The author points out that success in perimetry will not be attained by the use of complicated and expensive apparatus but by the study and application of simple principles. Not less essential is a knowledge of the visual path so that a correct interpretation can be made of the results obtained.

The book is divided into two parts. In part 1 the author describes the normal field of vision, perimetric instruments, methods of examination and the physiology of the visual field in relation to clinical perimetry. In part 2 he deals with applied perimetry in which he discusses the pathological field, the interpretation of changes in the visual field, the choroid and retina, glaucoma, the optic nerve, the chiasma, the supra-chiasmal pathway and the functional changes in the field of vision. There is also an appendix in which are described the isopters for white and colour in the normal field, the blind spot, the anatomy of the visual pathway, the uses of the perimeter and screen otherwise than in field testing and tables of tangents and degrees for use with Bjerrum's screen.

The third edition does not differ very much from the previous ones except that a foreword has been contributed by Mr. Norman Dott from the standpoint of the neurologist and neuro-surgeon and forty-eight new illustrations have been added.

The book is delightfully written, well illustrated and easy to follow and understand. It is a book which will be found essential to every medical man working in India who is interested in ophthalmology or neurology. The author is to be congratulated on his great work and every ophthalmologist and neurologist should be grateful to him for his helpful volume.

E. O'G. K.

REFRACTION OF THE EYE.—By A. Cowan, M.D. 1938. Henry Kimpton, London. Pp. 319. Illustrated with 172 engravings and 3 coloured plates. Price, 21s.

In this work the author has endeavoured to employ the theory of ophthalmic optics in such a way that clinical aspects would emerge logically and in orderly sequence from their bases of scientific facts. His experience has resulted from nineteen years of teaching in the Graduate School of Medicine of the University of Pennsylvania and over thirty years of practice in ophthalmology.

The book consists of some three hundred pages divided into nineteen chapters. He first deals with media, the propagation of light and with reflection and refraction of light from plane and spherical surfaces. He next deals with the characters of lenses and then in six chapters applies these factors to the human eye. These chapters consist of the normal static eye, visual acuity, aperture of the system, accommodation, ametropia, accessory effects of the correcting lens, methods for the determination of the refraction of the eye, the management and optical treatment of ametropia and finally there is a chapter on contact glasses and telescopic spectacles.

The author has succeeded admirably in what he set out to do and is to be congratulated on producing such an excellent book. The style is simple and the illustrations are excellent. It is hardly suitable for the student but will be found most helpful for medical men who are interested in ophthalmology and for whom we strongly recommend it.

E. O'G. K.

THE BASIC MECHANICS OF HUMAN VISION.—By R. Brooks Simpson. 1939. Chapman and Hall Limited, London (11, Henrietta Street, W.C.2). Pp. viii plus 228. Illustrated. Price, 12s. 6d.

The least that can be said about the book is that in it the author introduces a refreshingly new, if not

an altogether revolutionary mode of approach to the science of ophthalmology. Whether it is due to the innate conservatism of the medical profession in general or to the highly intricate nature of this particular branch of medical science, works on ophthalmology of this nature, in which the author dares to deviate from the beaten track, have been extremely rare, leaving aside of course publications by pseudo-oculists who claim to give us 'perfect sight without glasses'.

The author never asserts that glasses can be dispensed with altogether, but he insists that they are to be regarded as a means to an end. The sum of his assertion is that, in a patient born with normal infantile eyes, the refractive error in his visual mechanism must have been *ipso facto* subsequently 'developed', and it is his claim that this 'developed irregularity' is capable of being overcome by mechanical training (with aid of instruments depicted by the author) and as a corollary he holds that conditions secondary to primary mechanical irregularity are mainly capable of elimination by normalization of the action of the visual mechanism.

To this problem the author devoted a life-time of research and this book is the record of his painstaking and conscientious effort.

T. A.

'THE ETIOLOGY OF TRACHOMA'.—By L. A. Jullianelle. 1938. The Commonwealth Fund, New York, and Oxford University Press, London, Humphrey Milford. Pp. xv plus 248. Illustrated. Price, \$3.25. Obtainable from Oxford University Press, Bombay and Calcutta

THOUGH trachoma is undoubtedly one of the most important diseases in ophthalmological practice in India, comparatively little attention has so far been paid in this country towards the elucidation of the ætiological factors responsible for this disease. Commendable efforts have been made by the workers in various western countries to study the causative factors involved and the literature on the subject has grown to a voluminous extent during the last 10 years. Dr. Louis Jullianelle, Chairman of the Trachoma Commission of the Washington University, has done a great service to ophthalmologists by presenting in a handy little volume a clear and lucid summary of the important work done by himself and his co-workers along with a review of the whole subject of trachoma. There is little doubt that the book will be welcome to all those interested in the field, particularly to those who are engaged in research work.

The book is divided into ten chapters with introductory remarks at the beginning and a general discussion at the end. In these chapters the subject is treated with particular reference to epidemiology, causation, and infectivity of the disease. The rôle of the micro-organisms associated with the disease, the inclusion body, the relation of virus to trachoma, the purification of the infectious agent, the cultivability of the infectious agent in tissue culture and the various other properties of it—have all received detailed and adequate treatment.

According to the author the infectious agent of trachoma is 'a virus characterized by low infectivity, occasional filterability, marked tissue specialization, ineffectual immunogenic properties, slight propagative capacity, and sensitivity to deleterious agents. Whether the virus may be interpreted in turn as the inclusion body or more accurately the elementary form of the inclusion body remains to be proved although the evidence available at the present suggests this may be so'.

The book is well got up and the illustrations are beautifully executed. The bibliography is up to date and is grouped under topical headings. The book should find a place in the library of all progressive ophthalmologists and help in stimulating further research on this line.

T. A.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.—By William D. McNally, A.B., M.D. 1939. W. B. Saunders Company, Philadelphia and London. Pp. 386. Illustrated. Price, 17s.

THIS excellent book fulfils a need. For several years now in the textbooks on forensic medicine there has been a steady contraction of toxicology. The authors write for medical men who have not specialized in toxicology and give them the merest indication of what their colleagues in toxicology do. This book gives details. Up-to-date information is also available on war gases, gases used in refrigeration, and a dangerous slimming drug, dinitrophenol. It could have been mentioned that dinitrocresol and dinitrothymol are also dangerous.

Information on topics other than toxicology is sound. Some of it forms a rare record indeed. That in America (U. S. A.) coroners usually are politicians with no legal or medical training, that in the larger cities the attachés of the coroner's office are frequently accused of accepting bribes or of demanding certain fees, that x-ray medico-legal 'rackets' exist, and that lawyers and doctors unite wilfully to deceive courts of justice, will come as eye openers to law-abiding citizens used to the British system of upholding law and order.

In the precipitin test for blood perhaps some of the controls are in excess of the actual requirements.

The narrative has become confused and erroneous in the description of methods of determining blood groups. On page 70, from line 7, 'and B' should be deleted. Groups I and IV on page 71, para 3, are really groups IV and I of page 70. Nomenclatures of Jansky and Moss have been mixed. It would be better to discard them altogether in the next edition in favour of O, A, B and AB. Inheritance of M and N is not given.

The Americanism arrests attention in a few places but is not confusing. Prescriptions, for instance, are 'filled'; certain 'physicians' are surgeons.

The book should be in the library of all interested in forensic medicine.

The paper, the printing and the binding are good. No printer's error arrests attention.

S. D. S. G.

SURGICAL APPLIED ANATOMY.—By Sir Frederick Treves, Bart. Tenth Edition, revised by L. Rogers, M.Sc., F.R.C.S., F.R.C.S.E., F.R.A.C.S., F.A.C.S. 1939. Cassell and Company, Limited, London. Pp. x plus 748. Illustrated with 192 figures including 66 in colour. Price, 14s.

FIFTY-SIX YEARS is a long life for a medical book: in its earliest days this book stood almost alone, now it has many rivals, but it still holds its own. It was originally written by Sir Frederick Treves and during its long career of nine new editions and twenty-two reprintings it has been revised by such well-known surgeons as Sir Arthur Keith and Professor Choyce. It is five years since the ninth edition was published; this has been very completely revised and largely rewritten to produce the present edition.

Considerable pruning has been necessary and obsolete surgical procedures have been omitted: this particularly applies to the special section, on the eye, ear, nose and throat, in which matter the author has received considerable help from his contemporaries.

It is a book which still fulfils well the purpose for which it was first written and we can strongly recommend it to the surgeon, and the would-be surgeon.

WHITE SETTLERS IN THE TROPICS.—By A. G. Price. Additional notes by R. G. Stone. (Special publication No. 23.) 1939. American Geographical Society, Broadway at 156th Street, New York, N.Y. Pp. xiii plus 311. Illustrated. Price, \$4.00.

THIS is an attempt to review as a whole the success or failure of white settlement throughout the tropical lands of the world and all aspects of the problem are considered, namely, climatic, medical, social, economic, etc.

The author has apparently acquired his experience as a tourist, albeit with the special object of enquiry into this problem, and not as a sojourner for any appreciable time in any localities. As a result he has mainly relied on the written and spoken words of all kinds of people, some recognized authorities and some obviously local 'celebrities' only, so that the book is a mass of contradictory opinions with little attempt to sort the wheat from the chaff.

After reading the book the reviewer felt he was where he was at the beginning regarding the subject of white settlement in the tropics as no constructive suggestions are put forward. One point emerges, however, and that is that it is no more possible to lay down rules for successful European settlement for the whole tropics than it is to outline a universal scheme of malaria control, as each country has its own special problems which differ from most of the others and this is probably the main reason that the book has failed, in the reviewer's opinion, to make a definite contribution to this difficult and important problem.

AIDS TO GYNÆCOLOGICAL NURSING.—By H. M. Gratton, S.R.N., S.C.M., D.N. (Lond.). 1939. Baillière, Tindall and Cox, London. Pp. xii plus 160. Illustrated. Price, 3s. 6d.

This small book, one of the 'Aids' series for nurses, is intended to give the student-nurse a short easily-understood summary of the rudiments of gynæcology. A brief account of fertilization, pregnancy, and its complications, labour and the puerperium, is included.

A summary of the common gynæcological conditions, operations, preparation of the patient for operation and examination, nursing procedures, such as douching and catheterization, are carefully set out.

Drawings of the common gynæcological instruments and lists of requirements for shaving patients, insertion of pessaries, plugging the vagina, and other nursing 'operations' are of much assistance to the probationer-nurse.

An omission which will be regretted by readers in this country particularly is that of mention of vesico- and urethro-vaginal fistulae and their treatment. These distressing conditions are of great importance to nurses in India.

We can recommend this useful book to nurses undergoing general training, and consider that it would be a suitable work for training of Indian nurses, if translated into vernacular.

K. S. F.

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES, NO. 233. 'APPENDICITIS: A STATISTICAL STUDY.'—By Matthew Young and W. T. Russell. 1939. Published by His Majesty's Stationery Office, London. Pp. 64. Price, 1s.

'The remarkable progress of many branches of medical science in recent years must be contrasted with the relatively slow advance in knowledge in other important branches of medicine. Outstanding among this latter group are diseases associated with various parts of the alimentary canal. In spite of the high incidence of such conditions as gastric and duodenal ulcer, appendicitis and colitis, we remain remarkably ignorant of their causes. Of clinical material for their study there is an unlimited supply and yet, in spite of this, advance in knowledge of their causation is almost negligible. This does not mean that medicine and surgery are not able to bring great relief to patients suffering from these diseases, but it does mean that we still know too little about the predisposing factors to devise effective methods of prevention. Literature dealing with these diseases is nowadays concerned almost entirely with discussion of technical methods of treatment, and inquiries into causation are rare, probably because suitable experimental methods of producing the conditions in animals, which would allow a close study of their aetiology, are not available.

The report under review is based on a detailed investigation of the mortality statistics of this and other countries and of the statistics of certain hospitals.

The object of the survey was to determine whether any useful information could be obtained from such data, as to the factors which may influence the mortality from the disease and account for its very common occurrence at the present day. The figures relating to the frequency of appendicitis not only confirm that it is very prevalent, but show that it has apparently been on the increase in recent years. There is evidence, moreover, to suggest that the increase is real, and not due merely to greater knowledge and skill in diagnosis; for instance, amongst the insured population of Scotland the annual incidence of appendicitis increased appreciably even between 1930 and 1935, although this was not accompanied by any upward trend in the general sickness rate. Nevertheless, the mortality rate from appendicitis has remained relatively constant during the last twenty years, while the case fatality rate has fallen considerably, no doubt largely owing to the improvements in treatment, and especially in surgical treatment, which have occurred during this period.'

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES, NO. 234. 'REPORTS ON BIOLOGICAL STANDARDS—V. VARIABLES AFFECTING THE ESTIMATION OF ANDROGENIC AND ŒSTROGENIC ACTIVITY.'—By C. W. Emmens. 1939. Published by His Majesty's Stationery Office, London. Pp. 71. Illustrated. Price, 1s. 3d.

'ŒSTRONE, one of the forms in which the Œstrogenic hormone is excreted in the urine during pregnancy, was chosen some years ago to form an international standard preparation for the determination of Œstrogenic activity. At that time it was the only form in which the hormone was readily obtainable in sufficient quantity. The introduction of this standard enabled a unit of activity to be defined for general acceptance, in place of a wide series of unrelated units, in terms of different animal tests, which had confused both scientific notation and medical practice. It is now clear, however, that attempts to use this Œstrone standard to determine the activities of Œstriol, another excretory form of the hormone, and of Œstradiol, a form in which it is internally secreted to perform its physiological functions in the body, are subject to a number of sources of fallacy; thus, the results vary considerably with changes in the animal species (rats or mice) used for the comparative test, or in the method of solution of the substances for injection, or in the division and spacing of the doses injected. The apparent activities of these different forms of the same hormone are further affected, to different degrees, by the augmentor influence of other substances present in the preparation under test. Under such conditions it will be clear that little more than a conventional value can be attached to comparative determinations, in relation to the Œstrone standard, of the apparent Œstrogenic activities of crude extracts from urine or tissues, containing the different forms of the hormone in unknown proportions, with unknown admixture of substances capable of influencing the result.

It is clearly important that such factors of uncertainty should be fully recognized, and their significance measured.

Whilst the results obtained are not encouraging, the report is an important one and should be read by all interested in, or working on, this important subject.

TRANSACTIONS OF THE MEDICAL COLLEGE RE-UNION. VOLUME II. TENTH SESSION (1938-39).—Published by Dr. P. K. Guha, Honorary Secretary, Medical College Re-union, Medical College, Calcutta. Pp. 230. Illustrated. Price, Rs. 2

A NUMBER of valuable scientific papers were read during the annual re-union of the present and past students of Calcutta Medical College. This volume of the 'transactions' contains the addresses and scientific lectures delivered during the tenth session of the re-union held in December 1938.

The journal is divided into five sections. The first section contains the presidential address, the speeches delivered during the opening ceremony of the exhibition, prize distribution, the principal's report and the annual report of the secretaries, besides an editorial. The next three sections are devoted to medicine, surgery, and midwifery, and the students' section forms the fifth and last section.

The sections containing the scientific papers include a number of articles that will be read with great interest and benefit by students and general practitioners alike. Technical details of some of the articles, *viz*, those on the typing of pneumococci, the quality of cod-liver oil, tissue culture, will be appreciated better by the specialists working on these particular lines than by medical practitioners.

Some of the articles deserve special mention as being particularly valuable and instructive. In the section of medicine the articles on clinical heart disease, pellagra, sub-acute bacterial endocarditis are of great practical value. The articles dealing with the treatment of common skin diseases could not fail to interest the practitioner in this country where skin diseases are so common. The observations on a case of congenital heart disease (Lutembacher's disease) with heart block and auricular flutter will prove interesting to all

cardiologists as it is the report of a case of a very rare cardiac abnormality. Of the papers on tuberculosis, that dealing with gold therapy is likely to be useful as it is based on observations on a number of hospital cases. In the section of surgery, most of the papers are on special branches of surgery, the only paper on general surgery being that on strangulated hernia.

The papers on epidemic dropsy glaucoma deal with the different methods of treatment of this serious complication of epidemic dropsy. In the section of midwifery, the articles on ectopic gestation, blood pressure in pregnancy, paracentesis in the treatment of hydramnios, will be read with interest. The article on terata anadidyma gives record of a pathological curiosity and details of management of labour complicated by double monsters.

The students' section records the history of the Medical College Students' Club and the activities of the athletic, dramatic, social service and scientific sections of the students' club.

The format, printing, and illustrations are very satisfactory. The scientific sub-committee of the reunion who are responsible for this publication deserve congratulation.

Abstracts from Reports

EIGHTH ANNUAL REPORT OF THE KING GEORGE THANKSGIVING (ANTI-TUBERCULOSIS) FUND FOR THE YEAR 1938

THE most important feature of the year so far as tuberculosis in India is concerned was the successful result of Her Excellency the Marchioness of Linlithgow's appeal. The collection of funds has been associated with such a wide educational campaign that 1938 will be remembered as a special anti-tuberculosis year.

The appeal has met with a generous response but its success cannot only be judged by the amount of collections, for widespread attention has been focused on the dangers and problems of this disease. The good that has been achieved in this direction can never be measured; it may not be apparent to-day, but it is very real, and if the effort is sustained, we can count on the continued support of well-planned measures that will be initiated under the new scheme.

It is, however, advisable to remind the public that tuberculosis cannot be controlled by the building of tuberculosis institutions or by the application of any one method, and that the improvement of the health conditions, in particular housing, nutrition and the care of the health of the children are not only sound and successful anti-tuberculosis measures but are essential complements of a complete anti-tuberculosis scheme.

At the request of Her Excellency the Marchioness of Linlithgow, the King George Thanksgiving (Anti-Tuberculosis) Fund appointed two sub-committees, (1) a technical committee of medical men with expert knowledge of tuberculosis problem in India and (2) a constitution-drafting committee to consider the policies and planning of the proposed All-India Tuberculosis Organization to be formed as a result of the King-Emperor's appeal.

The recommendations of the technical committee on being accepted by the fund committee were submitted to Her Excellency and issued from the appeal office as a note on the tuberculosis problem in India for the guidance of provincial organizations.

TRAINING OF TUBERCULOSIS WORKERS

(a) Post-graduate courses

Training of doctors in the modern methods of diagnosis, prevention and treatment of tuberculosis is an established activity under the fund. Post-graduate courses have been held since 1935 and 220 doctors have

so far received training, but the demand for training from provinces and states is still increasing. Forty-five doctors were selected out of 300 applicants for training, during the year, at two courses held at the All-India Institute of Hygiene and Public Health, Calcutta (January-February 1938) and Mayo Hospital, Lahore (November-December 1938). The selection was as far as possible equitably distributed over the different provinces and states and due regard was paid to the candidates' past experience in tuberculosis. As in previous years no admission or tuition fees were charged and we paid the out-station candidates single second-class fare up to a maximum of Rs. 100.

(b) Training of tuberculosis health visitors

In our last annual report we referred to the increasing demands for trained tuberculosis health visitors in connection with the work of the tuberculosis clinics, that had been or were to be opened. A tentative scheme for special training of fully qualified nurses for this work was drawn up in 1936, but from the information collected through the heads of the provincial medical departments, regarding the condition of nursing services and the best type of worker to meet the peculiar conditions in India, it became clear that though in theory a fully-qualified nurse with special training in tuberculosis is essential for this work, in practice, trained nurses are not available. In some of the provinces a nursing profession hardly exists and such nurses as there are find employment in general hospitals, which are all understaffed. Moreover in isolated instances where such candidates are available, the provincial organizations are unable to find the high salaries demanded by such workers. It was suggested that matriculate girls with a special course of training (6 to 9 months) in tuberculosis and in general health visiting work should meet the conditions peculiar to India.

The fund committee at their meeting of the 17th February appointed a technical committee to re-consider the scheme in the light of information available from the provinces.

The scheme suggested by the sub-committee was approved by the fund committee with minor alterations and Rs. 3,500 sanctioned for the first course in 1939. The main points about the scheme are:—

1. That the fund committee should undertake the training of tuberculosis health visitors at Delhi with

the help of the Lady Reading Health School and the Silver Jubilee Tuberculosis Hospital.

2. That the first course be open to women only.

3. That only candidates recommended by the provincial and state sub-committees be accepted for training. Private candidates will be accepted only for special reasons and on special terms.

4. That the maximum number of students should not exceed 10 in each course.

5. That candidates need not be qualified nurses for health visitors, but must be at least matriculates of a university or possess some equivalent qualification.

6. That the candidates must not be under 21 years of age.

7. That the period of training should be six months followed by a probationary period of one month at a tuberculosis clinic under the provincial committee recommending the candidate or in Delhi. The period of training to be divided as under:—

(a) Three months at the tuberculosis hospital mainly devoted to practical nursing of the tuberculosis patient and to include a theoretical course of at least ten lectures on tuberculosis followed by

(b) Three months' course at the Lady Reading Health School for theoretical lectures and practical home visiting. Syllabus to cover the following:—

(1) Hygiene—

Personal hygiene	} 25 lectures.
General	
Public health administration.	
school hygiene, industrial hygiene.	

(2) Domestic science—

Household management	} 25 lectures.
Cookery	
Dietetics	
Elementary economics	

(c) Qualified health visitors should be exempted from the three months' course at the Lady Reading Health School.

(8) A certificate should be granted by the fund committee to the successful candidates on the termination of the course.

(9) The first course should be started in January 1939.

(10) Each candidate should receive a stipend of Rs. 20 per month, with free furnished quarters which will be provided by the tuberculosis fund.

(11) The employment and pay of successful candidates will be a matter entirely for the provincial tuberculosis committees who depute them for training. Seventeen applications were received through the provincial state committees and ten candidates have been selected with due regard to the territorial distribution and the development of the tuberculosis clinics in each area. The course was inaugurated on the 16th January and is now in progress.

Educational activities

The educational activities from the centre have been directed mainly towards creating contacts with and stimulating interest of individuals and organizations interested in public welfare. It was emphasized during this year that the best way of attracting public opinion is through the educated section of the community and that short special courses are a very useful form of activity. Short courses on tuberculosis among organized groups like teachers, university students, St. John Ambulance Brigade Overseas Divisions, and nurses have been organized with the help of the authorities concerned and all necessary help was given from headquarters.

(a) *Popular literature*

The fund maintains a stock of suitable educative material in various languages. Ten thousand two hundred and twenty-six pamphlets and leaflets and 8,678 posters and charts were distributed free through educational institutions, public libraries, maternity and child welfare centres, health exhibitions and other

social organizations. Sales of stocks registered a marked increase, 11,273 pamphlets and 53,506 posters and charts being sold as compared with 4,166 pamphlets and 14,014 posters and charts in 1937.

The following new literature was issued during the year:—

1. What a teacher should know about tuberculosis; in English, Urdu and Hindi.

2. Prevention of tuberculosis; in Hindi.

3. A dangerous teacher and the lessons he teaches about tuberculosis; in English. (By Dr. C. Fridmott-Möller.)

4. Anti-tuberculosis work in Bengal; in English. (By Dr. A. C. Ukil.)

(b) *Tuberculosis slides*

A new set of 21 slides was prepared during the year. This set proved popular. Twenty-one sets were issued from the dépôt as compared with 11 in 1937.

(c) *Tuberculosis films*

Our tuberculosis films were in great demand this year and were circulated through the Red Cross film circulating library. Three copies of the films causation and prevention of tuberculosis were sold during the year.

(d) *Red Cross Journal*

News about tuberculosis activity and popular articles on tuberculosis have been contributed to the journal throughout the year.

Co-ordination of provincial activities

To meet the difficulty of early diagnosis of open cases amongst poor patients the fund committee approached the local governments through its provincial/state committees, to provide free sputum-examination facilities for poor patients on the recommendation of a qualified medical practitioner, at all public health laboratories and district and taluq hospitals. The Government of India was also requested to commend this proposal to all Provincial Governments.

Information bureau

The fund office is the Central Information Bureau regarding all matters relating to tuberculosis in India. Large number of enquiries from organizations and individuals are answered and this work has considerably increased during the last two years.

Hasan-Masud Suhrawardy Memorial Anti-Tuberculosis Challenge Shield

The shield was awarded to Delhi Municipality for having shown the best anti-tuberculosis activity in 1937. It is a work which attracted attention not only by its sound organization on general principles but by its rapid growth during its short period since 1936.

The anti-tuberculosis activities are many-sided and are well co-ordinated through the Public Health Department, which is in charge of the educative part of the work.

The housing schemes in Delhi under the Municipality and the Improvement Trust whereby some slums have been cleared, insanitary *bustees* removed and arrangements made for housing poor people in new areas are such that they are bound to have a permanent effect on the anti-tuberculosis movement in this city.

(a) *International Union Against Tuberculosis*

Close co-operation has been maintained with the Union. The fund continued to be a member with General Bradfield and Dr. Ukil as councillor members. All enquiries made by the Union have been answered and specimen posters and literature issued by the fund have been sent to anti-tuberculosis organizations who are members of the Union. We kept in touch with the anti-tuberculosis work in other countries through the *Quarterly Bulletin* of the Union. Copies of this bulletin were supplied to all provincial/state committees.

Research

Research in tuberculosis is an activity under the Indian Research Fund Association.

Dr. C. Frimodt-Møller attended the 16th Research Workers' Conference at New Delhi from 12th December to 17th December, as a representative of the King George Thanksgiving Fund and Mr. B. K. Sikand, Organizing Secretary, worked as the Joint Secretary of the Tuberculosis Advisory Committee of the Conference.

The main lines of work under Dr. Ukil with regard to tuberculosis in relation to the jute industry and its 'dust hazards' was continued. Further investigation has confirmed previous years' findings.

In 1938, the work was extended to a tuberculosis survey amongst students and nurses of the K. E. Medical College, Lahore, and school children at Amritsar.

Headquarters library

Books to the value of Rs. 105 were added during the year to the tuberculosis reference library at headquarters. Several workers took advantage of this library.

INDIAN RED CROSS SOCIETY, NEW DELHI: ANNUAL REPORT FOR THE YEAR 1938

REPORT OF THE MANAGING BODY

THE Indian Red Cross Society continued its general peace-time activities and in addition provided assistance for relief work to sufferers from the floods in Bengal and Assam, and for famine in the Hissar District in the Punjab.

In response to an appeal of the International Red Cross for the continuation of relief operations in Spain the Indian Red Cross Society made a monthly contribution of Rs. 250 during the last six months of the year under review and two provincial branches made similar monthly contributions through the Society, making a total of Rs. 2,285 during the year.

The International Red Cross made further appeals for relief work in China and early in the year the Society made a contribution of Rs. 5,000. A contribution of Rs. 3,662 was also made by branches for the same cause. Towards the end of the year, on receipt of further news of serious distress in China the Society voted a sum of Rs. 1,500 and arranged to send a supply of drugs. It also issued an appeal for funds and gifts of drugs and provisions through the press.

The Indian Red Cross Society delegation to the XVIth International Red Cross Conference held in London was led by Major-General E. W. C. Bradfield in the absence of Sir Firoz Khan Noon, who was at the time in Geneva.

The Society made its usual subscription of Rs. 1,000 to the International Red Cross Committee, Geneva, and increased its annual contribution towards the administrative expenses of the League of Red Cross Societies, Paris, to £250 sterling. The Society has further agreed to increase the contribution to an equivalent to 1,250 dollars = £258 at the request of the League for the year 1939.

The separation of Burma from the administrative control of India and the subsequent formation of a new Red Cross Society in Burma which had been a branch of the Indian Society entailed an adjustment of funds which with the necessary legal formalities was completed during the year. A sum of Rs. 5,24,800 was transferred to Burma.

The total number of branches of the Red Cross in India at the end of 1938 was 26 provincial and state and 265 district branches compared with 25 and 241 respectively last year. Khairpur and Indore States formed separate branches in direct affiliation with headquarters.

The Annual General Meeting of the Society took place as usual at the Viceroy's House on 24th March and was well attended. His Excellency the Marquess of Linlithgow presided and their Excellencies graciously invited members and guests to an at home before

the meeting. Earlier in the day an informal conference of delegates took place at the Red Cross Building when the relation of the Red Cross with the St. John Ambulance Association and Brigade Overseas and the Red Cross plan of collections for the King-Emperor's Anti-Tuberculosis Fund were discussed. The new Red Cross film on 'Self-help in Villages' was exhibited.

One of the primary duties of the Indian Red Cross Society is to provide for medicine and other aid to the sick and wounded in the event of war and the mobilization plan is a comprehensive scheme which embraces the activities of the Indian Red Cross Society, the St. John Ambulance and St. John Ambulance Brigade Overseas as an auxiliary to the army medical and nursing services in time of war. This important plan has been drawn up in consultation with provincial organizations and will ensure the fullest possible co-ordination between headquarters and branches when put into action. The Red Cross Roll of Trained Nurses for War and Disaster which forms part of the mobilization plan had 68 nurses on the list.

Headquarters and branches continued to take a very active interest in the appeal made by Her Excellency the Marchioness of Linlithgow for the King-Emperor's Anti-Tuberculosis Fund. In addition to providing office accommodation to the appeal fund staff headquarters distributed propaganda folders in English, Urdu and Hindi, supplied special lantern slides, movie film leaderettes and propaganda dialogue on the subject for broadcasting from all radio stations in India in their rural hour programme. The branches also took an active part in the campaign for the collection of funds in their own areas throughout the year. In November His Excellency the Viceroy was pleased to approve the scheme of the dissociation of the King George Thanksgiving (Anti-Tuberculosis) Fund from the Indian Red Cross Society with a view to the formation of an independent Tuberculosis Association of India.

KING GEORGE THANKSGIVING (ANTI-TUBERCULOSIS) FUND

The Fund has since November 1930 continued to be administered by a sub-committee of the Society. During 1938 Major-General Bradfield was the Chairman of the sub-committee and Dr. B. K. Sikand its Organizing Secretary.

The outstanding feature of the year was the successful appeal of Her Excellency the Marchioness of Linlithgow for the King-Emperor's Anti-Tuberculosis Fund. Her Excellency in issuing the appeal stated that if it was successful the intention was to found a Tuberculosis Association for India, consisting of a central body supported by affiliated provincial and state organizations. The setting up of a comprehensive organization with the help of the new fund will mark a new and important development towards a more effective control of tuberculosis in India.

MATERNITY AND CHILD WELFARE BUREAU

The committee of the Maternity and Child Welfare Bureau administered the funds of the Lady Chelmsford League, the Victoria Memorial Scholarships Fund and the Army Child Welfare Fund.

The funds of the Lady Chelmsford League were distributed mainly as grants-in-aid of training schools. The schools for health visitors in Delhi, Calcutta, Madras, Rangoon and the new school in Poona received grants during the year.

The Madras Health School was closed in March 1938 and the funds thus made available were diverted towards the support of the newly opened training school for Nursery School Teachers, Madras. The Nursery School and Kindergarten, Mysore, and the School of Mothercraft, Bareilly, also received grants.

A scholarship was provided for a medical woman graduate for the course of the Diploma in Maternity and Child Welfare at the All-India Institute of Hygiene and Public Health, Calcutta. A few additional grants were given direct from Bureau funds to certain maternity and child welfare schemes, one of

which was a grant towards the work of the Najafgarh Rural Unit.

The majority of civil welfare centres aided by Indian Red Cross funds received their grants direct from the provincial branches of the Indian Red Cross Society.

The Victoria Memorial Scholarships Fund was distributed almost wholly as grants-in-aid for *dai* training. Grants were given to seven *dai* training schools. Other aided schemes give institutional and domiciliary training, or are entirely domiciliary, the training being carried on in connection with welfare centres. Some of the *daies* on completion of training and after passing an examination receive V.M.S. certificates of which 139 were issued during the year, while others are given the trained-*dai* certificates of the province or state *dai* school.

The Army Child Welfare Fund was distributed to 54 Indian and 26 British Army centres during the year 1938. Army child welfare work owes much to the help and enthusiasm of voluntary workers and the progress in this field is marked. But the lack of training in preventive work of sub-assistant surgeons and nurses appointed to Army child welfare centres, is in many cases a handicap to constructive work, and facilities for such training for sub-assistant surgeons and the replacing of nurses and midwives by trained health visitors is much to be desired.

The Junior Red Cross activities for the promotion of health increased in all directions, specially in anti-epidemic and village improvement work.

At the request of the High Commissioner for India a comprehensive series of exhibits were supplied to the Women's Pavilion at the Glasgow Empire Exhibition; these included posters, pamphlets and cut-out models showing the part taken for relief of disaster and work among women and children.

The Depot distributed a large amount of health and Red Cross propaganda material to provincial, state and district branches, and also to Government departments of health, private bodies, health centres, educational institutions, officials and others.

There were two railway accidents, one in U. P. on the G. I. P. Railway near Bamrauli and the other in Madras on the South Indian Railway near Madura for which the services of nurses on the Red Cross Roll of Trained Nurses for Disasters were offered, but the services were not needed. A grant of Rs. 1,000 was given each to Assam and Bengal for relief work to the sufferers of floods in the provinces. For famine relief measures in Hissar District in the Punjab a sum of Rs. 500 was granted.

Indian ex-service men were assisted as before through the Soldiers Boards. The U. P. Branch paid for the treatment of 17 ex-soldiers suffering from tuberculosis at the Bhowali Sanatorium and the Punjab Branch for giving institutional treatment to 14 ex-soldiers.

ANNUAL REPORT OF THE PUBLIC HEALTH DEPARTMENT IN THE CENTRAL PROVINCES AND BERAR FOR THE YEAR 1937

THE year 1937 was comparatively a healthy one. The death rate was 32.63 per thousand of the population as against 34.89 in the preceding year and the quinquennial average 31.98. This is satisfactory as far as it goes, but much leeway has yet to be made up as the mortality rate of the province is still the highest in India. The Provincial Government are convinced of the necessity of a fully-trained and whole-time public health service on which will fall the responsibilities of studying the epidemiological conditions and organizing and supervising such important matters as water-supply, vital statistics, infant and maternal welfare, hygiene and nutrition. As a step in the direction of the expansion of the public health department, Government have made provision in the current year's budget for the appointment of twenty-five sub-assistant health officers, in addition to the present staff. This will give one sub-assistant health officer to each *tahsil* in the province.

Although the mortality from malaria during the year fell from 274,670 to 267,558, the disease continued to take a heavy toll, being responsible for 53 per cent of the total mortality from all causes. The evil is so widespread that many people regard it as inevitable and its eradication as impracticable. In reality, however, malaria is neither inevitable nor incurable. Drainage and flushing, oiling of stagnant water and mosquito curtains will prevent it, while quinine will cure it. Prevention is clearly the right policy, but it will take time to bring the disease under control in this province. Meanwhile, Government desire to see no efforts spared to make quinine more easily available and at cheaper rates in all parts of the province.

There is a fall in the mortality from all causes except plague and dysentery. The ravages of plague in recent years have not been so great as in the past, but the public should not be lulled into a false sense of security. If the scourge is to be driven out of the province all local bodies must intensify anti-rat campaigns. The main causes of the major infectious bowel disease of the province, *viz.* cholera, typhoid fever and dysentery, are known to be avoidable and can be traced to bad water-supply, primitive conservancy arrangements and unsatisfactory drainage.

The mortality among infants under one year of age fell from 234.98 per thousand births to 218.16, the quinquennial average being 222.63. The rate is, however, still the highest in India, the lowest being 115.86 in the neighbouring province of Bihar. The main causes of the infantile mortality are prematurity, inanition, malnutrition (chiefly owing to want of mother's milk), diarrhoea, respiratory diseases and fevers. The child welfare and maternity movement, which is making steady progress, is intended to take effective measures to minimize their evil.

Government are greatly concerned about the prevalence of leprosy in the province and are considering the extension of anti-leprosy measures. Four new clinics were opened during the year—two by Government and two by the British Empire Leprosy Relief Association. Provision has also been made in the current year's budget for the establishment of three more leprosy centres. This will bring the total in the province to 40. With a view to organizing public opinion on the subject and carrying on educative propaganda, Government have decided to introduce a scheme for the establishment of district leprosy councils and propose in the current year to open five such councils in the districts where the disease is most widely prevalent.

Correspondence

A NOTE ON SOME CASES OF LATHYRISM IN A PUNJAB VILLAGE

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I have read with much interest Dr. Shah's article on lathyrism cases in a Punjab village and your leader commenting on this article in the July number of the *Indian Medical Gazette*.

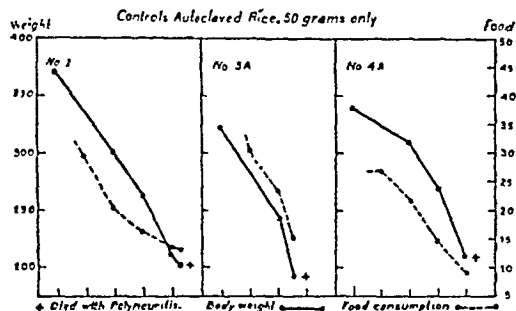
This once more raises the controversy, toxin *versus* avitaminosis, and it is naturally of great interest to me to see that so far as this outbreak goes it appears to support the *akta* theory as originally conceived by Mr. A. Howard (now Sir Albert Howard), at that time Imperial Economic Botanist to the Government of India, and subsequently worked on by Dr. J. L. Simonsen and myself in association with him.

The absence from cultivation or consumption as a foodstuff in the area concerned of *L. sativus* would appear to have definitely exploded the theory that this pulse has a direct causal relationship to the disease, a conclusion which we reached, of course, in 1925, but though the contamination of the wheat with

V. saliva provides a tempting and suggestive alternative. this fact, as you point out, unfortunately does not exclude other possible causes such as avitaminosis.

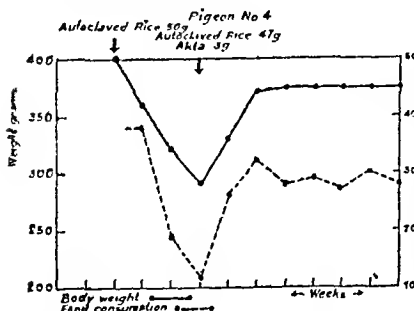
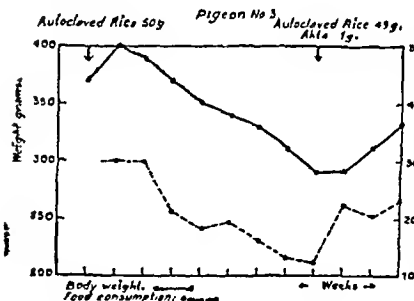
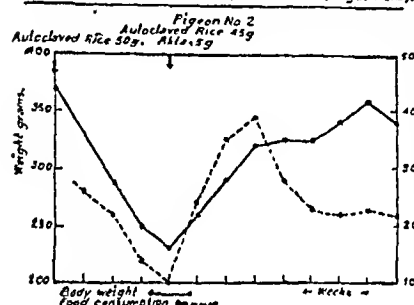
Whilst this question, therefore, still requires an answer I can say with assurance that the disease we produced in animals as a result of feeding them with *akta*—if indeed it corresponds to lathyrism in the human subject—was not due to any lack of antineuritic vitamin in the *akta* seeds.

Owing to the superficial resemblance to polyneuritis columbarum of the disease exhibited by ducks poisoned



by *akta*, we conducted a number of experiments (unpublished hitherto) on pigeons, to determine whether or no *V. saliva* was deficient in antineuritic vitamin.

The Antineuritic Value of *Akta* (*Vicia sativa* var. *Angustifolia*).



Pigeons were fed on an exclusive diet of autoclaved rice, as described by McCarrison, until polyneuritis was fully developed and the birds were at the point of death. At this point a very small quantity of rice was replaced by raw *akta* seeds. The introduction of even as little as 3 g. daily of these seeds rapidly brought about a cure of the polyneuritic symptoms and complete recovery of the birds in four to five weeks. Control birds invariably died after three to four weeks on the exclusive diet of autoclaved rice unless supplemented by the fresh seeds.

Three grams of *akta* seeds, of course, represented only a few seeds scattered among the mass of 50 g. of rice, and it was interesting to see how the sick birds

immediately picked out the raw seeds and how rapidly appetite and consequently the food intake was increased and accompanied by an increase in body weight. None of the birds in this little experiment suffered from the disease we had associated with *akta* poisoning (? lathyrism), either because the quantity of *akta* ingested was too small, or the duration of the experiment was too short. But, of course, the object of the experiment was only to show that the seeds were not deficient in antineuritic vitamin.

The accompanying graphs show the result of this experiment with three pigeons and corresponding controls.

The graphs show that the vitamin content of 3 g. of *akta* (pigeon no. 4) is ample to bring about a cure of polyneuritis in pigeons, whilst 1 g. of the seeds (pigeon no. 3) though sufficient to prolong life and bring about an improvement in the condition of the birds, is probably insufficient to establish a complete cure.

Yours, etc.,

L. A. P. ANDERSON,
LIEUTENANT-COLONEL, I.M.S.

PASTEUR INSTITUTE,
SHILLONG,
3rd August, 1939.

DEMANDS OF MEDICAL FEES FROM MEDICAL MEN

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—I would very much like your opinion on the subject of fees payable by medical men to other medical men for professional attendance on themselves or their families?

Of specialists who expect, or even demand, a fee one hears much more frequently now than, say, twenty years ago.

Personally, I do not accept a fee. When medical men consult me regarding themselves or other medical men or their families (including widows) and want to know about payment I tell them that the question of payment does not arise. Am I wrong?

I have had occasions to consult medical men in Europe. They have not charged me. From recent accounts given by colleagues, regarding attendance on their families, the position in England, however, does not appear to be clearly defined.

Yours, etc.,

MEDICAL USAGE.

CALCUTTA,
31st August, 1939.

SNAKE BITES AND THEIR TREATMENT IN INDIA

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—In the July issue of the *Indian Medical Gazette* a very interesting article 'Snake Bite' by Colonel Chopra and Captain Chowhan was published.

It is mentioned in the article that 'viper' bite prevents clotting of blood, thus encouraging oozing of blood from the nose, vagina and stools, etc.

It is not clear to me why this same viper venom is successfully employed in cases of haemophilia or bleeders, and allied diseases where the coagulability of blood is delayed or prevented.

In other words, this viper venom is used as a cure for the same disease that it produces. I have in various medical discussions on this side endeavoured to find out a suitable reply to this query, but it has been always asserted that there are two varieties of vipers and the viper whose venom is employed as a cure for bleeders is quite different from the other variety of vipers.

I have to request you to clear this point.

Yours, etc.,

S. A. SUBEDAR, L.C.P.S., R.M.P.

KUTIYANA,
W. KATHIAWAR,
4th August, 1939.

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—With reference to Dr. Subedar's enquiry regarding the anomalous action of viper venom, there had been already a good deal of discussion on its different actions, pharmacologically and therapeutically. In mammalian and human blood both these actions depend on the dose of the venom injected and its concentrations in the blood. To be clearer these different actions may be explained as follows:—

(a) *Viper venom as a coagulant agent.*—Macfarlane and Barnett (1931, *Lancet*, ii, 985) have shown that in as low concentration as from 1-10,000 to 1-10⁶, Russell's viper venom, when brought in contact with blood *in vitro*, causes immediate coagulation. For this property this venom has been used therapeutically to stop hemorrhages and other conditions of bleeding diatheses.

(b) *Viper venom as a hemorrhagic agent.*—Russell's viper venom produces severe hemorrhages in all the serous cavities, lungs, brain, kidneys, skin, etc., when injected pharmacologically in big doses in experimental animals or when a victim is bitten fatally. We have shown that this venom has a strong proteolytic property; it digests fibrin and jellies rapidly.

The above antagonistic actions of Russell's viper venom may be explained thus: When the venom enters the general circulation its concentration is low, and hence it causes at first coagulation of blood fibrin, and such fibrin clots are observed at post-mortem

examinations in big vessels and in the chambers of the heart, but later as the concentration rises the clot is digested again by the excess amount of venom in the blood. The blood becomes fluid and fibrin free, as if it had been defibrinated. This action has been explained in other ways as well, i.e., the dose of venom injected at each bite is so big that the blood has no time to clot since the whole of the fibrin is digested by the venom; also there is a severe damage to the endothelial lining of the capillaries with consequent extensive hemorrhages.

BIOCHEMICAL STANDARDIZATION LABORATORY,
ALL-INDIA INSTITUTE OF HYGIENE AND
PUBLIC HEALTH, CALCUTTA,

Yours, etc.,
J. S. CHOWHAN,
M.B., B.S.,
CAPTAIN, A.I.R.O.

11th August, 1939.

Service Notes

APPOINTMENTS AND TRANSFERS

THE VICEROY AND GOVERNOR-GENERAL has been pleased to make the following appointment on His Excellency's Personal Staff:—

To be Honorary Surgeon

Colonel D. H. Rai, M.C., vice Colonel A. F. Babonau, C.I.E., O.B.E., vacated. Dated 22nd June, 1939.

Colonel D. H. Rai, M.C., returned from leave and resumed charge of the Office of Inspector-General of Civil Hospitals, C. P. and Berar, from 26th August, 1939.

Lieutenant-Colonel J. M. Mitchell, O.B.E., to be Officiating A. D. M. S., Kohat District. Dated 31st July, 1939.

Lieutenant-Colonel M. S. Joshi to be Officiating A. D. M. S., Peshawar District. Dated 3rd July, 1939.

Lieutenant-Colonel P. R. Vakil to be O. C., I. M. H. Nowshera. Dated 2nd July, 1939.

Lieutenant-Colonel A. N. Sharma to be Officiating O. C., I. M. H., Delhi. Dated 30th June, 1939.

Lieutenant-Colonel J. C. Chukerbuti to be O. C., I. M. H., Jubbulpore. Dated 15th July, 1939.

Lieutenant-Colonel R. S. Aspinall, C.I.E., Agency Surgeon, on return from leave, resumed charge of his appointment as Chief Medical Officer in the Western India States Agency and Residency Surgeon, Rajkot, with effect from the afternoon of the 5th August, 1939.

Lieutenant-Colonel A. J. D'Souza, on return from leave, assumed charge of the duties of the Civil Surgeon, Moulmein, on the forenoon of the 4th August, 1939.

Lieutenant-Colonel N. S. Jatar, C.I.E., D.S.O., Inspector-General of Prisons, C. P. and Berar, ceased to hold the additional charge of the Office of Inspector-General of Civil Hospitals, with effect from the 26th August, 1939.

Lieutenant-Colonel B. H. Singh, M.C., Civil Surgeon, Mysnensingh, is appointed as Civil Surgeon, Howrah, vice Captain J. White, transferred.

Major A. N. Chopra was transferred to Civil employment in C. P. and Berar. Dated 11th July, 1939.

Major D. P. Lambert, Civil Surgeon, Meerut, reverted to Military from 3rd August, 1939.

Major M. R. Sinclair posted as Civil Surgeon, Agra, from 3rd August, 1939.

Major C. A. Bozman is appointed to the Civil Branch of the I. M. S., with effect from the 1st April, 1937. He will count his seniority in civil employment from the 9th August, 1933.

(Previous notification, in so far as it relates to Major Bozman, is cancelled.)

Captain M. G. Saincher reverted to military duty at the I. M. H., Secunderabad, from the Hyderabad State Service on 18th July, 1939.

Captain I. J. Franken-Evans was transferred to Civil employment at the Irwin Hospital, Delhi. Dated 19th July, 1939.

Captain W. A. N. Marrow to be Officiating O. C., I. M. H., Poona. Dated 26th July, 1939.

Captain W. S. Empey, O.B.E., left the I. M. H., Ambala, for duty with the Army in Burma on 30th July, 1939.

Captain Shwe Zan, on transfer from the Military Department, assumed charge of general duty at the Rangoon General Hospital, on the afternoon of the 4th August, 1939.

Captain S. Ahmad transferred from Agra to Fyzabad where he assumed charge on 8th August, 1939.

Captain J. W. D. Goodall, Civil Surgeon, Midnapore, is appointed as Second Resident Medical Officer, Presidency General Hospital, Calcutta, vice Dr. W. A. Browne, transferred.

Captain J. White, Civil Surgeon, Howrah, is appointed as Civil Surgeon, Midnapore, vice Captain J. W. D. Goodall, transferred.

Captain R. L. Raymond, on return from leave, assumed charge of the duties of Ophthalmic Surgeon, Rangoon General Hospital, on the forenoon of the 24th August, 1939.

Lieutenant G. T. Hayes is restored to the establishment. Dated 1st May, 1939, with seniority from 1st May, 1938.

To be Lieutenant (on probation)

Vivian D'Arcy Blackburn. Dated 11th April, 1939, with seniority from 11th April, 1934.

Indian Land Forces

(Short Service Commission)

To be Lieutenants

Dated 22nd June, 1939

Balbir Krishna Kapur.
Prem Chandra Dhandu.
Panavelil Thomas Joseph.
Hans Raj Pasricha.
Nityananda Chakravarti.
Mohammad Sarwar.
Dhruva Kumar Bose.
Sailendra Nath Chatterjee.
Komattil Kumara Menon.

Dated 24th June, 1939

Mohammad Seraj-ul-Haque.

LEAVE

Colonel D. C. V. Fitzgerald, M.C., K.H.P., A. D. M. S., Madras District, proceeded on 3 months and 5 days' combined leave in and *ex-India*, pending retirement, with effect from the 17th July, 1939.

Brevet-Colonel J. W. Vanreenan, O.B.E., O. C., I. M. H., Abbottabad, proceeded on 3 months and 5 days' combined leave *ex-India* from 7th July, 1939.

Lieutenant-Colonel J. L. D. Yule, O. C., I. M. H., Delhi, proceeded on 12 months' combined leave *ex-India* from 30th June, 1939.

Lieutenant-Colonel H. E. Murray, Officiating Professor of Midwifery, Medical College, Calcutta, is granted leave for 6 months, with effect from the 21st August, 1939, or from the date of relief.

Major B. Chaudhuri, Senior Medical Officer, Port Blair, is granted an extension of leave on average pay from the 1st August to 28th September, 1939, and his services are placed at the disposal of the Government of Bengal, with effect from the 29th September, 1939.

Captain F. W. Allinson, First Resident Medical Officer, Presidency General Hospital, was granted leave for 12 months, with effect from the 3rd March, 1939. Previous notification is hereby cancelled.

Captain A. E. Kingston was granted leave for 1 year, including 8 months on average pay and 4 months on half-average pay, from the forenoon of the 1st August, 1939.

Captain C. C. Kapila was granted leave for 1 year, including 8 months average pay and 4 months on study leave from the 15th August, 1939.

Captain R. D. MacRae, an Officiating Agency Surgeon, is granted leave on average pay for 4 months combined with study leave for 3 months and leave on half-average pay for 5 months, with effect from the afternoon of the 15th October, 1938. Previous notification is hereby cancelled.

PROMOTIONS

Lieutenant-Colonels to be Colonels

R. Sweet, D.S.O. Dated 21st June, 1939, with seniority from 25th July, 1935.

A. C. Macrae. Dated 21st June, 1939, with seniority from 25th July, 1935.

To be Brevet-Colonel

Lieutenant-Colonel A. MacD. Dick, C.B.E., V.H.S. Dated 1st July, 1939.

Major to be Lieutenant-Colonel

M. P. Atkinson. Dated 12th August, 1939.

Captains to be Majors

P. V. Bamford. Dated 15th July, 1939.

H. D. R. Zscherpal, M.B.E. Dated 15th July, 1939.

K. Jilani. Dated 26th July, 1939.

D. H. Waldron. Dated 26th July, 1939.

C. H. Dhala. Dated 8th August, 1939.

J. R. Dogra. Dated 25th August, 1939.

S. Narain. Dated 25th August, 1939.

Captain to be Major (provisional)

S. Kharegat. Dated 15th July, 1939.

Lieutenants (on probation) to be Captains (on probation)

C. C. Harvey. Dated 24th May, 1939, with seniority from 1st July, 1938.

D. F. Eastcott. Dated 1st July, 1939.

L. H. Cooper. Dated 1st August, 1939.

To be Captain (on probation)

Henry Bunting Wright. Dated 7th June, 1939, with seniority as Lieutenant from 21st June, 1933, and as Captain from 21st June, 1934.

RELINQUISHMENTS

The undermentioned Officers relinquished their probationary appointments:—

Captain J. H. Briscoe-Smith. Dated 5th July, 1939.

Lieutenant O. T. Mansfield. Dated 3rd July, 1939.

RETIREMENTS

Colonel W. L. Watson, O.B.E. Dated 21st June, 1939.

Colonel N. S. Sodhi, M.C. Dated 9th August, 1939.

Brevet-Colonel R. N. Chopra, C.I.E., K.H.P. Dated 17th August, 1939.

Lieutenant-Colonel A. W. Duncan. Dated 11th July, 1939.

The following retirements, with gratuity, are permitted subject to His Majesty's approval:—

(Short Service Commission)

Captain M. L. Gujral. Dated 19th May, 1939.

Captain Mohan Singh. Dated 21st May, 1939.

Captain D. R. Sharma. Dated 23rd May, 1939.

Captain P. S. Bassalvi. Dated 23rd May, 1939.

Captain G. N. Ahmadi. Dated 25th May, 1939.

Captain B. S. Bindra. Dated 16th June, 1939.

Captain W. A. Mirza. Dated 21st June, 1939.

RESIGNATIONS

Captain A. H. W. Mitchell. Dated 18th April, 1939.

Captain G. C. A. Jackson (ill health). Dated 14th July, 1939.

Captain N. P. Woodgate-Jones. Dated 10th July, 1939.

Captain J. W. Richmond. Dated 26th July, 1939.

Notes

FUNCTIONAL UTERINE HÆMORRHAGE
TREATED BY TESTOSTERONE PROPIONATE

Mrs. M., aged 25, one child aged 6. History of repeated irregular and severe uterine hæmorrhage, and she had been curetted two or three times for this.

In January 1938 she had curettage for pain and severe hæmorrhage and a portion of the retained placenta was removed. After this she appeared to improve for some time and the periods became regular, lasting seven or eight days, while the pain disappeared.

Then in June 1938 she started with pain in the right side and hæmorrhage. The hæmorrhage occurred every two or three days, lasting three or four days at a time, and the loss was considerable. She also states that while she was pregnant with her child six years ago she had her periods the whole nine months. There is nothing else in the history of note.

Examination revealed a thinnish, extremely pallid woman. There was nothing abnormal in her heart, lungs, liver, spleen or kidneys. The teeth and throat were clean, pupils and reflexes were normal. There was slight psoriasisiform eruption over the left hip. Wassermann was negative.

The patient was admitted to hospital on 31st October, and under gas and oxygen anaesthesia vaginal examination disclosed the following: A smallish retroverted mobile uterus, and the right ovary was slightly enlarged and felt cystic and the rest of the adnexæ appeared normal. Dilatation and curettage were performed and the uterine scrapings were sent to the South African Institute for Medical Research for biopsy. The following is the report: 'There is no evidence of lesion of the metropathia hæmorrhagica and endometrium is in the lutein phase. There is some slight interstitial endometritis'.

On the 12th November, 1938, treatment was commenced with Testosterone propionate (Testoviron-Schering) 20 mgm. intramuscularly twice a week. On the 21st November there was a very slight sore and pain in the right side was much better. On the 24th November she reported there was no hæmorrhage since 17th November. On the 26th November there was a slight sore and on the 6th December she reported that she had hæmorrhage from the 4th to 6th December.

During this time treatment was stopped as this was probably a true period. On the 9th December

treatment was resumed and on the 30th December treatment was stopped. On 7th January, 1939, a period started lasting five days and was strong for the first two days. No more treatment was given, and on the 3rd February periods started again and finished on the 7th. The flow was not unduly severe. On 20th February dilatation and curettage were done again and scrapings sent to the South African Institute for Medical Research, and the report is as follows: 'No evidence of luteinization and the endometrium shows characters of the quiescent resting stage'.

Here we have a case of obvious over secretion—of Progesterone caused by the probable presence of small lutein cyst in the right ovary. In view of this, treatment with Progesterone was contra-indicated and therapy with follicular hormone and gonado-tropic appeared to have no physiological indication. Therefore a trial was made with the male hormone. Zuckerman has done considerable work with the male hormone (Testosterone propionate) in female *rhesus* monkeys and in the baboon. He found that the male hormone had an inhibiting effect on the folliculization and luteinization and was able to produce amenorrhœa with it. Other workers have had similar results in human females, hence I was prompted to try it, rather than to resort to operative interference, with the above successful results.

One had anticipated producing amenorrhœa of a temporary character but this never occurred. The patient received in all 240 mgm. of the male hormone and there was no unpleasant sequelæ such as hirsuties, enlargement of the clitoris, etc., in fact, she has received nothing but benefit.

She has had no treatment since 30th December, 1938, since when she has had two comparatively normal periods with no intervening hæmorrhage. This patient is apparently quite cured; her general health is much improved and her pallor has disappeared.

B. W. FRANKLIN BISHOP, M.B.,
ch.n. (Cape Town), F.R.C.S. (Ed.),
Kimberley.

(From the *South African Medical Journal*,
25th March, 1939, p. 211.)

A METAL BOUGIE-CATHETER

THE Mayo Hospital, Nagpur, is a hospital at which assistant medical officers are trained. These students both post-graduates and under-graduates have to be taught how to relieve retention of urine in the male without causing unnecessary damage to the urethra. Many of the cases of retention of urine, which come to the hospital, are of a difficult and serious nature owing to the prevailing neglect of proper treatment of gonorrhœa. I have found Phillips filiform bougies and follow-through catheters (obtainable from Messrs. Eynard, Paris) invaluable for many cases. Unfortunately, gum-elastic articles do not keep well in the climate of the Central Provinces and they are difficult to sterilize in the out-patient department.

It was with great interest that I read the note by Mr. Milroy Paul in *The Lancet*, of 7th September, 1935, on his urethral bougie and catheter combined.

This set of bougies was made to my design by Messrs. Down Bros., London, to obviate the necessity for passing a metal catheter, in dealing with that common emergency, acute retention of the urine from stricture.

The bougies have the shape of Lister's bougies and, in addition, a narrow channel running through their long axis.

The bougies have proved very satisfactory in practice, as they are passed more easily than a metal catheter owing to their greater weight, better balance and their bulbous ends, and I also prefer to use them instead of a metal catheter in cases of enlarged prostate, where occasionally it is necessary to use a metal catheter to relieve acute retention.

I was about to order a set when I read the note by Mr. Harold Dodd in the *British Medical Journal* on his 'Lister's bougie and dilating sound with Béniqué's curve'.

'In a ten-years' experience of dilatations of urethral stricture I have found that certain obstructions can only be negotiated by a Lister bougie, whilst to pass others the curve of a Béniqué instrument is necessary. In using the otherwise excellent French bougie the absence of the graduated shaft and of the weighted handle of the Lister pattern was repeatedly felt, and out of this arose the idea of combining the two instruments in one in order to secure the advantages of both.

A graduated set made for me by Messrs. Down Bros. and Messrs. Lewis Brothers has the peculiar curve of the Béniqué bougie, with the olive-headed tip neck, tapered shaft, weighted handle, and sizes of the Lister instruments. I have used it regularly for eighteen months and have found that it fulfils its purpose well. It usually "falls in", the dilatation is gradual, and it is effective in passing a tortuous urethra. In addition, it is very useful for determining the potency of the common bile duct into the duodenum, and for stretching the ampulla of Vater.'



As illustrated, Messrs. Down Bros. prepared for me a set from 5/8 to 15/18 combining the ideas of Mr. Harold Dodd and Mr. Milroy Paul (a spigot and stilette are also supplied but are not shown in the illustration). These central-channelled sounds are easily sterilized, they can be used for relieving most cases of acute retention of urine and are suitable for dilating almost every kind of stricture. They should be made of stainless steel. The plated ones are dangerous.

After the sound has been passed and before it is withdrawn the bladder can be filled with antiseptic solution, thus ensuring that the urethra is subsequently flushed with a cleansing substance.

Some cases of retention of urine due to stricture reach the Mayo Hospital after a number of ineffectual attempts have been made outside to relieve the condition. If such cases are at all toxic I find that it is much safer to treat them by means of a Pezzer's self-retaining suprapubic catheter, using a trocar and cannula for inserting it. The self-retaining catheter is left in position until all signs of toxæmia have disappeared and until the stricture has been dilated to size 8/11 English gauge or until the patient commences to pass urine naturally, which he usually does.

F. R. W. K. ALLEN,
D.M., M.A.O. (Dublin Univ.)

8th March, 1939.

AN ENTIRELY NEW FOCAL (WATER-COOLED) ULTRA-VIOLET RAY LAMP—THE KROMAYER LAMP MODEL V

Forty-three years ago Nils Finsen first cured *lupus vulgaris* by focal actinotherapy. The principles on which he worked have since been applied to the cure of many other diseases both of the skin and of the official membranes. Applied at first only by skin specialists, focal actinotherapy has been greatly extended in scope since the introduction of the handy Kromayer lamps, and is to-day used widely in medical practice and dental surgery. Physically considered, the source of radiation required for focal actinotherapy must fulfil three main requirements:—

Intrinsic 'brilliance' of ultra-violet radiation.

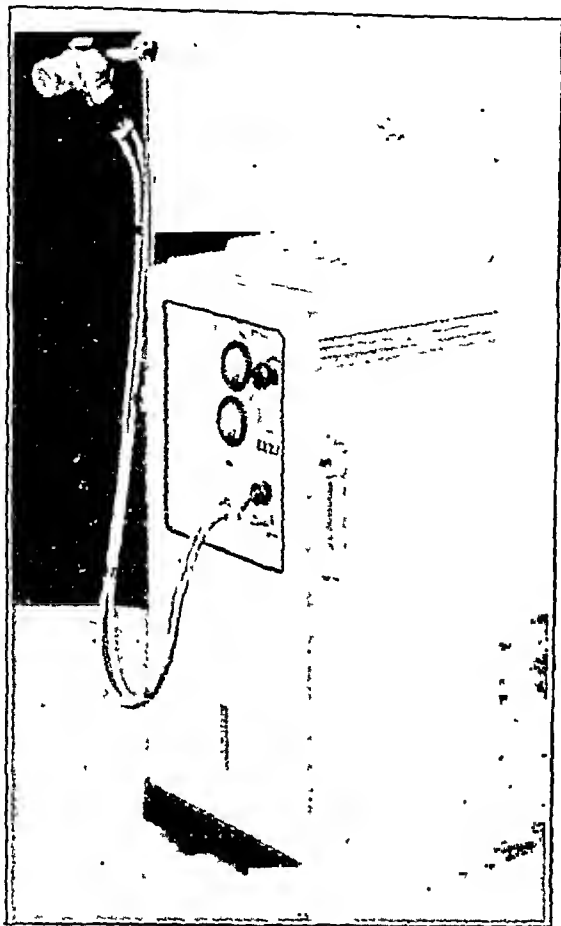
As nearly as possible a point source.

Application at the shortest possible distance from the skin.

In all these respects, the Kromayer lamp (Model V) now introduced is a revolutionary advance upon any actinic source hitherto available to the medical practitioner.

This new lamp functions on different principles to any Kromayer lamp hitherto produced. It will operate

freely and with equal intensity in any position—horizontally, vertically (even upside down). The practitioner can thus utilize procedures which were hitherto impossible. Ultra-violet irradiation can be applied through the window or along quartz applicators, to any accessible lesion, with very brief times for application.



It has super-intensity, giving a contact erythema dose within 3 seconds, and a deep therapeutic reaction (fourth degree erythema, or blister dose) within 20 seconds. Its power is so great that the practitioner can select required wave-lengths (using suitable filters) for any application, with ample reserves of energy.

The lamp embodies special provisions to ensure consistency and accuracy in dosage.

A large range of quartz applicators and glass filters are available for use with the new lamp, also a stop-watch for timing exposures. The makers are Messrs. Hanovia Ltd. of Slough, Bucks.

THE 'AGLA' ATOMISER

THE value of an atomiser in which all the parts in contact with the medicament are made of glass is at once obvious. The 'Agla' atomiser, introduced by Burroughs Wellcome and Co., produces an effective vapour-like spray from aqueous or thin oily liquids which come into contact with glass only. The atomiser is so constructed that the larger globules of atomised liquid are effectively retained, so that only the finer spray is emitted. Having a flat base and being fitted with a rubber stopper, the atomiser may conveniently be used as a container for the medicament. When filling the atomiser the level of the liquid should not be more than half-way up the delivery tube. A dropper is provided for transferring medicaments to



the atomiser. The 'Agla' atomiser is of particular value for medication by the oral inhalation method, in which case the patient directs the spray into the open mouth, synchronising deep inhalations with sharp compressions of the bulb. This method is being increasingly employed in the symptomatic treatment of mild or moderately severe asthma, the medicament used being solution of adrenaline, 1 in 100. The 'Agla' atomiser may also be used with advantage for general medication of the nose, throat and upper respiratory passages.

DAGENAN (M. & B. 693)

IMPORTANT PRICE REDUCTION

THE large demand which has followed the introduction of M. & B. 693 (DAGENAN) has enabled the manufacturers to effect a reduction in the selling price of this product.

They inform us that as from Monday, 2nd October, the following prices will be brought into force:

DAGENAN (M. & B. 693)

0.50 gramme

Containers of 25 tablets .. Rs. 5-10-0 each.

Containers of 100 tablets .. Rs. 22-2-0 each.

0.125 gramme

Containers of 25 tablets .. Rs. 3-3-0 each.

Boxes of:

6 × 25 c.c. ampoules Rs. 5-4-0 per box.
20 per cent suspension.

DAGENAN SODIUM

Boxes of:

6 × 3 c.c. ampoules solution Rs. 9-0-0 per box.

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Original Articles

REPORT OF THE USE OF M. & B. 693 IN PNEUMONIA, PNEUMOCOCCAL MENINGITIS, AND PNEUMOCOCCAL EMPYEMA, WITH REPORTS ON TWO CASES OF EXFOLIATIVE DERMATITIS AND ONE OF AGRANULOCYTOSIS DUE TO M. & B. 693

By G. F. TAYLOR, M.A. (Camb.), M.R.C.P. (Lond)
MAJOR, I.M.S.

Professor of Clinical Medicine, King Edward Medical College, Lahore

and

NAND LAL CHITKARA, M.B., B.S.

(Working with a grant from the Punjab Government)

A report of the use of M. & B. 693 in the first 50 Indian cases treated in the Mayo Hospital, Lahore, India, with alternate cases treated as controls, was published in this journal earlier in the year (Chand *et al.*, 1939). The mortality in this small group was 10 per cent in the treated, and 18 per cent in the controls. Only patients who lived longer than 24 hours after admission into the hospital were included in either group.

From November 1938 to the end of June 1939, 159 cases of pneumococcal pneumonia in Indian patients have been treated by this drug in the Mayo Hospital; there have been 11 deaths, a mortality of 6.9 per cent. It is not proposed to publish a detailed report of these cases, as the results agree with those published in other parts of the world, in England (Royal Soc. Med., 1938), Africa (Agranat *et al.*, 1939) and America (Long, 1939).

In this series of M. & B. 693-treated cases, there were four patients who developed empyema in the hospital following pneumonia, *i.e.*, 2.5 per cent, a figure which is not higher than the incidence of empyema in cases treated by methods other than 693.

It was noted that the temperature came down to normal within 48 hours of giving this drug in all but 26 of the 159 cases.

The cause of sustained temperature in these 26 cases was found to be :—

Developing empyema in 4 cases, pneumococcal meningitis in 3 cases, lung abscess, malaria, ankylostomiasis with severe anaemia, tertiary syphilis, 'creeping' type of pneumonia, pre-existing tuberculosis in 1 case each, severe toxicity in 9 patients of whom 5 died, and less severe toxicity in 4 cases in which no obvious cause was found.

From the experience of treating these cases, a complication is suspected if the temperature does not fall within 48 hours from beginning treatment with M. & B. 693. This would seem to be

of particular importance in countries where there is a high incidence of malaria, ankylostomiasis, or other tropical diseases.

Twenty cases showed a rise in temperature after the usual fall to normal. No cause could be found in 6 cases : in the remaining 14 it was as follows :—

Malaria—6 cases, inadequate dose—2 cases, pre-existing tuberculosis, parotitis, jaundice, malnutrition (pellagra), pericarditis, and 'creeping' type in 1 case each.

It has been noted here, as elsewhere, that although the temperature falls to normal, the resolution takes place at the normal time and in the normal manner. The stay in hospital of all cases is reduced by an average of 4 days for each case, an important matter where hospital accommodation is very limited.

Typing by Neufeld's 'Quelling' method and by the agglutination method was begun after 693 had been in use for some months. The following results have been obtained :—

Relation of 693 treatment to types of pneumococci

Type	Number of cases treated	Deaths	REMARKS
I	39	3	All the three cases died of meningitis complicating pneumonia.
II	5	Nil	
Mixed I and II	3	..	
III	4	..	
VI	1	..	
VII	4	..	
Indeterminate group.	10	1	

This work is being continued and results will be published in more detail later.

Pneumococcal empyema

In addition to the four patients noted above, who developed empyema in the hospital, four others have been admitted into the medical wards and treated with M. & B. 693, repeated aspiration, and later by operation. Typing of pneumococci was done by Neufeld's 'Quelling' method and confirmed by the agglutination method. Neufeld's method gave positive results in 6 cases. In one case Neufeld's method gave a negative result, but the agglutination method showed positive type I. Thus, of the 8 empyema cases, 7 were type I, and 1 case was not typed as sera were not available.

Three patients were cured by M. & B. 693 combined with aspiration. In 2 of these cases (cases 1 and 3 of table I) the pus was not thick and aspiration was done only once and twice, respectively. Case 2 had thick pus in the chest, aspiration was done 15 times and a total dose of 85.5 gm. of M. & B. 693 in 30 days was given. In all the 3 cases, skiagram of the chest on discharge from the hospital showed a little

thickening of the pleura. It was decided to treat the other 5 patients by M. & B. 693 combined with aspirations, to avoid the operation of rib resection, if possible.

Although this treatment of repeated aspiration, combined with M. & B. 693 in large doses, was continued for periods up to $1\frac{1}{4}$ months, these efforts were unsuccessful. Four cases eventually came to operation and 1 patient

coccus acquires tolerance to M. & B. 693 within a few days.

Also reports of serious complications of M. & B. 693 treatment, such as agranulocytosis and exfoliative dermatitis, are accumulating. It is concluded that the drug exerts its influence during the first few days of its administration and that it is useless and dangerous to continue its use after four or five days.

TABLE I
Empyema cases

Serial number	Sex and age	Date of admission	Date of discharge	Side of the chest	Post- or syn-pneumonic type.	Type of pneumococcus	Total days of illness	Number of aspirations	Character of pus	Total 693 in grammes	In number of days	Result	Severity and complications	W. B. C. counts
1	M., 25	12-1	28-1	Left	Post-	..	4	1	Thin	18½	5	Cured	++	6,875
2	M., 25	10-1	27-4	Do.	Syn-	1	68	15	Thick	85½	30	Do.	+++ Epistaxis vomiting.	16,875 25,000 20,750 12,000
3	F., 4	25-3	7-5	Do.	Post-	1	29	2	Thin	22	21	Do.	+	9,000 6,000 7,000 13,000
4	M., 30	11-5	5-6	Do.	Syn-	1	37	3	Thick	38½	26	Died *	+++	16,875 7,500 3,125 5,625 2,625
5	M., 18	25-4	21-6	Do.	Post-	1	78	6	Do.	55	16	Operation	+++	15,625
6	M., 28	3-5	8-6	Right	Syn-	1	51	6	Do.	32	7	Do.	+++	15,000 13,000
7	F., 8	28-3	10-6	Left	Post-	1	79	5	Do.	25	32	Do.	+++	9,375
8	M., 5	28-4	30-5	Right	Do.	1	62	2	Do.	12†	8	Do.	++	12,500 11,250

* This patient had agranulocytosis and dermatitis exfoliativa.

† Six gm. were given outside the hospital.

In table I as well as in table II severity of the disease was graded as +, ++, +++ and ++++ depending upon the general condition, condition of the tongue, abdominal reflexes at the time of admission to the hospital.

died of agranulocytosis and exfoliative dermatitis; the case notes are given below.

We have concluded from the experience of these cases that when the pus is thin, aspiration combined with treatment by M. & B. 693 is indicated. When the pus becomes thick and loculated, prolonged treatment with M. & B. 693 with aspiration does not clear the empyema and an operation is indicated at an early stage.

These conclusions support the findings of Maclean, Rogers and Fleming (1939) in laboratory animals and Ross (1939) in work on a case of pneumococcal meningitis, that the pneumo-

Pneumococcal meningitis

During this period, 4 of the 139 M. & B. 693-treated pneumonia cases developed pneumococcal meningitis and 13 other cases of pneumococcal meningitis were treated by M. & B. 693 and daily lumbar puncture. Details of these are shown in table II. Of these 17 cases, 3 recovered, a recovery rate of 17.4 per cent. Of these 3 recovered cases, pneumococci were present in the cerebro-spinal fluid (CSF) in 2 cases, in which there had been no previous pneumonia. In the third patient who recovered, a purulent meningitis developed after a type-I

pneumonia; he had been treated by M. & B. 693. The CSF was turbid and contained pus cells but was not under tension. It was concluded that the growth of pneumococci in the CSF had been inhibited by the 693 given previously for the pneumonia. It is debatable whether this case should be included under the heading of pneumococcal meningitis. As yet intrathecal M. & B. 693 has not been given in the hospital.

dermatitis in 693 treatment. We, therefore, report the two following cases:—

Case 1.—Parsee male, aged 30, admitted to general wards of Mayo Hospital on 11th May, 1939. Eleven days previously he had suddenly developed a high temperature with a rigor. A diagnosis of lobar pneumonia of the left lower lobe was made. At the onset he had some bleeding from the nose. As the temperature continued for 11 days, he was sent to hospital for admission. No details of treatment outside the hospital were available.

TABLE II
Pneumococcal meningitis cases

Serial number	Sex and age	Days of illness	Total 693 in grammes	In number of days	Concentration of 693 in mgm. per cent in blood, after 24 hours' administration	Type or group	W. B. C. counts	Severity and complications	Result	REMARKS.
1	F., 8	5	3.5	2	..	IV	12,500	++++	Died	Secondary to broncho-pneumonia. Primary.
2	M., 25	7	27'	4	6 3.5 in CSF	I	20,500	++++	Do.	
3	M., 40	7	18	4	3.5	IV	22,000	+++	Do.	After mastoidectomy. Secondary.
4	M., 18	9	4	1	..	I	16,000	+++	Do.	Do.
5	M., 30	4	21	3	11.6	I	18,000	+++	Do.	Do.
6	M., 35	1	4'	1	..	I	..	++++	Do.	Developed thermal reaction. Secondary.
7	M., 35	11	28	4	6	I	8,775	+++	Do.	Secondary.
8	M., 50	11	75	11	6 3.5 in CSF	I and II	25,000	++++	Do.	W. R. positive; secondary.
9	M., 40	18	4	1	..	IV	15,000	+++	Do.	Secondary.
10	M., 40	1	6	1	..	I	..	+++	Do.	..
11	M., 1	22	1	1	..	..	13,750	+++	Do.	Secondary.
12	M., 36	1	6	1	..	..	..	+++	Do.	..
13	M., 35	3	9	3	..	..	..	+++	Do.	Secondary.
14	M., 20	2	20'	..	..	..	12,000	++	Cured	Primary.
15	M., 20	16	16'	..	..	..	28,000	++	Do.	Do.
16	M., 26	14	23	10	..	I	9,375	+++	Do.	Secondary*.

Additional treatment and notes

- Case 2. Anti-serum, 50,000 units I.
- " " " " 50,000 " II.
- " 6. " " 20,000 " I.
- " " " " 20,000 " II.
- " 14. Prontosil—5 injections.
- " 15. M. & B. 693—4 injections.
- " 16. Pneumococci in sputum. None in CSF (turbid).
- " 17. M., aged 30, came to hospital in comatose condition and died after 4 hours. Pneumococci were present in the CSF. No treatment could be given.

We can only trace 6 cases of pneumococcal meningitis reported in the literature (MacKeith and Openheimer, 1939; Banks, 1938; Cunningham, 1938; Reid and Dyke, 1938) in which recovery occurred after M. & B. 693 treatment.

Agranulocytosis and exfoliative dermatitis complicating M. & B. 693 treatment

Details of 5 cases of agranulocytosis in England (Sutherland, 1939) and one case in America developing as result of 693 have been published, but we have not yet seen reports of exfoliative

The patient was well built and well nourished. He had been a moderate smoker, did not drink alcohol and lived on a good mixed diet including meat.

On examination:—

Tongue furred. Semi-comatose and very toxic. Abdomen distended—constipated. Temperature 100°F., pulse 130, and respiration 34. Consolidation of whole of left lung and some consolidation of right lower base. Blood pressure 128/45. The cause for the low diastolic pressure was not found. White cell count 16,875 per c.mm. Hæmoglobin 95 per cent. He coughed up no sputum.

(It was learnt after the exfoliative dermatitis had developed that he had been given 15 gm. M. & B. 693 in the 11 days before admission to the hospital.)

Treatment.—He was put on M. & B. 693, 4 tablets on admission, 4 tablets after 4 hours, and thereafter 2 tablets 4 hourly, for 36 hours and then 1 tablet 4 hourly.

The temperature was unaltered by this treatment and ranged between 100 and 104.5.

A skiagram taken three days after admission showed a large dense shadow in the left middle zone of the lung, which was thought to be a loculated empyema.

An exploratory paracentesis with a lumbar puncture needle in the seventh intercostal space produced 10 oz. of fairly thick creamy pus.

In this pus, pneumococci were seen on staining. These were typed by the agglutination method and found to be type I.

The white cell count on 16th May was 7,500, with polymorphonuclears 67 per cent, lymphocytes 31 per cent and monocytes 2 per cent.

The general condition had become worse. Because of the low white cell count, M. & B. 693 was stopped. The concentration of the drug in the blood on 13th May was 6 mgm. per cent. The white cell count continued to fall; it was 4,375, 3,125, 5,625 and 2,625 on 23rd May, 25th May, 28th May, and 3rd June, respectively.

A lumbar puncture produced normal CSF.

On 26th May the skin was covered with erythematous blotches which progressed to typical exfoliative dermatitis in which the whole of the skin was shed. Aspiration was done twice more and a few ounces of thick pus removed. As the condition was becoming still worse rib-resection was done on 4th June under local anaesthesia; but the patient died on 5th June.

Pentnucleotide injections were begun on 4th June. It was not available earlier. Unfortunately blood transfusion was not done. A total dose of 38.5 gm. M. & B. 693 was given in 26 days. It was stopped when the diagnosis of the skin condition was made.

Case 2.—Treated in Lahore City by a private practitioner. A Muslim male child, aged 5, suffering from fever, duration 6 months. He had catarrhal signs present in the chest. X-ray showed tuberculous infiltration of the lungs. Sputum was negative for tubercle bacilli. Mantoux reaction was positive. An exact diagnosis was not made. Because of the few pneumococci present in the sputum, he was put on M. & B. 693, 1½ tablets daily for 7 days. After 10 tablets had been given, he developed a morbilliform rash all over the body and high temperature. The drug was continued in spite of the rash which was thought to be measles. The rash progressed to exfoliative dermatitis. The condition became worse and the child died four days after the skin condition developed. The total dose given was 15 tablets, i.e., 7.5 gm., in 10 days. Further details are not available, as neither of us saw the case ourselves.

This case seems to us to show that M. & B. 693 should only be given under strict medical supervision.

Summary

1. In 159 cases of pneumococcal pneumonia treated at the Mayo Hospital, Lahore, 11 deaths occurred, a mortality rate of 6.9 per cent.

(Continued at foot of next column)

M. & B. 693 IN INDIAN STRAINS OF MALARIA

By R. N. CHOPRA, C.I.E., M.A., M.D., S.C.D. (Cantab.), F.R.C.P. (Lond.)

BREVET-COLONEL, I.M.S. (Retd.)

R. T. M. HAYTER, M.B.E., I.M.D.

and

B. SEN, B.Sc., M.B. (Cal.)

(From the School of Tropical Medicine, Calcutta)

For the last few years sulphonamide derivatives have been the subject of intensive study on the part of chemists, experimental pathologists, and clinicians. Prontosil, whose active principle has been shown to be p-amino-benzene-sulphonamide, has proved to be an excellent drug for the treatment of various infective conditions. A number of new compounds have also been produced, whose activity depends on the presence of this molecule, and which have

(Continued from previous column)

2. The causes of the temperature not coming down to normal after 48 hours of giving M. & B. 693 in pneumococcal pneumonia are discussed.

3. It is concluded from the study of the use of the drug in 8 cases of pneumococcal empyema that it is useless and dangerous to continue its use for longer than 4 or 5 days.

4. Seventeen cases of pneumococcal meningitis are reported of which 3 recovered with M. & B. 693 and daily lumbar puncture treatment, a recovery rate of 17.4 per cent.

5. Two cases of exfoliative dermatitis due to M. & B. 693, in one of which there was agranulocytosis, are reported.

Acknowledgments

We wish to thank Lieut.-Colonel Amir Chand, I.M.S., professor of medicine, King Edward Medical College, Lahore, for his collaboration and for allowing us to report on cases treated in his ward, R. B. Dr. Jiwan Lal, professor of pathology, for his help in typing, May and Baker for supplying some of the drug free of charge, and Mrs. Bharucha for supplying funds for buying the remaining quantity of the drug.

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been found to possess similar therapeutic properties. With regard to their effect in the treatment of malaria, the views are divergent; for instance de Leon (1937), who was the first to report the effect of prontosil in malaria, treated a number of cases with apparently good results. Other reports have not been favourable (Read and Pino, 1938). Recently, Chopra *et al.* (1939) tested the efficacy of prontosil in human malaria. They found 3 to 4 gms. daily for 5 days possessed an undoubted action in causing disappearance of malaria parasites from the peripheral blood and controlling the symptoms of the disease.

M. & B. 693 is another drug, allied to prontosil, which has also been extensively used by the medical profession in various infective conditions with remarkable success. Recently, Chopra and Das Gupta (1939) tested the efficacy

symptoms, anti-malarial treatment was withheld for a few days in order to select only those cases which did not show any tendency to spontaneous recovery. Approximate estimations of the number of parasites were made daily and the treatment was started when the parasite counts were fairly uniform for two or three days. Daily examinations of blood for malarial parasites were carried out during the course of treatment and also for a few days after the completion of the treatment. The effects of the drug on (1) temperature, (2) the sexual and the asexual forms of the parasites, and (3) the time taken for the disappearance of the parasites from the peripheral blood were studied. Any untoward effects produced were recorded. Whenever possible the patients were kept under observation for a fortnight or so after the treatment was completed and the cultural examina-

TABLE

Race, Sex and Age	FINDINGS OF PARASITES BEFORE TREATMENT PER 500 LEUCOCYTES				Total dose of M. & B. 693 in grammes	FINDINGS OF PARASITES DURING AND AFTER TREATMENT. PARASITES PER 500 LEUCOCYTES										Days of fever after beginning treatment
	Species	As.	Sex.	2nd day		3rd day		4th day		5th day						
						As.	Sex.	As.	Sex.	As.	Sex.	As.	Sex.			
H., M., 38	B. T.	850	V. Sc.	7.5	150	V. Sc.	Sc.	0	V. Sc.	0	0	0	3*			
M., M., 21	M. T.	Sc.	V. Sc.	7.5	Sc.	Sc.	Sc.	Sc.	0	Sc.	0	Sc.	3*			
H., M., 25	M. T.	1,000	0	7.5	650	0	250	0	90	0	Sc.	0	4*			
M., I. Ch., 20	B. T.	Sc.	0	10	Sc.	0	Sc.	0	0	0	0	0	2*			
H., M., 23	B. T.	++	Sc.	15	Few	Sc.	Sc.	Sc.	V. Sc.	Sc.	0	Sc.	3†			
	M. T.		(Crescents)			(Cr.)		(Cr.)		(Cr.)		(Cr.)				
H., M., 52	B. T.	1,500	Sc.	15	700	Sc.	550	Sc.	180	0	0	0	4†			
H., M., 39	B. T.	Sc.	Sc.	15	Sc.	Sc.	Sc.	0	0	0	0	0	2†			
M., M., 25	B. T.	V. Sc.	0	15	V. Sc.	Sc.	0	Sc.	0	Sc.	0	0	1†			
M., M., 31	M. T.	++	0	15	+	0	Few	Sc.	Sc.	Sc.	Sc.	Sc.	3†			
H., M., 36	B. T.	1,200	Sc.	15	200	Sc.	350	Sc.	Sc.	Sc.	0	0	3†			
A.-I., F., 5	Qt.	Sc.	Sc.	7.5	Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	Sc.	4‡			

* indicates recrudescence.

† " no "

‡ " parasite-free two days after treatment was finished.

of this drug in monkey malaria. They found that unlike prontosil this compound is capable of destroying the monkey plasmodium (*Plasmodium knowlesi*) in dosage which is even less than what is regarded as the proportionate dose for a monkey as compared with that of man. Moreover, the parasites once disappearing after a five days' course of treatment do not appear again in the peripheral blood, at least in sufficient numbers to be detected in thick films.

In view of the encouraging results obtained with this drug in monkey malaria, we carried out a preliminary investigation in the Carmichael Hospital for Tropical Diseases on a series of cases of human malaria in order to find out how effective the drug is in Indian strains of malaria. The results of this trial have been recorded in the present paper.

The patients were all admitted into hospital and, with the exception of those showing urgent

tions of blood were also carried out in a number of cases to determine if the infection had been eradicated.

The drug was administered by the mouth in all cases. We first started with one tablet (0.5 gm.) three times a day for 5 days, and later increased the dose to 2 tablets four times a day.

The table shows that M. & B. 693 has a mild but definite action on the malaria parasites. In cases of infection with *P. falciparum* the asexual forms disappear from the peripheral blood within three to six days, but the sexual forms remain unaffected (cases no. 2, 3, 5 and 9). In infections with *P. vivax*, both the asexual and the sexual forms disappear from the peripheral blood within three to five days (cases no. 4, 5, 6, 7, 8 and 10). In the case with quartan infection, the parasites persisted for two days after the course of treatment. It

(Continued at foot of next page)

COOLEY'S ERYTHROBLASTIC ANÆMIA

By L. EVERARD NAPIER, M.R.C.P. (Lond.)

J. A. SHORTEN, M.D., B.Ch., M.R.C.P. (Lond.)

LIEUTENANT-COLONEL, I.M.S. (Retd.)

and

C. R. DAS GUPTA, M.B. (Cal.), D.T.M.

School of Tropical Medicine, Calcutta

ERYTHROBLASTIC anæmia, or Cooley's anæmia, is a distinct clinical syndrome that was first described by Cooley (1927) about 12 years ago. Koch and Shapiro (1932) collected 18 cases from the literature and added 5 cases from their own experience. Most of the cases have been reported from the United States and nearly all the patients have been of Mediterranean stock, usually Italian or Greek, but one patient was an English child. We have seen no reference to the incidence of the disease in an Asiatic. The condition appears to have a familial tendency as in 10 of the 23 recorded cases, referred to above, a brother or a sister was also affected.

All the reported cases have been in young children. The first symptom appears in early infancy, in one case there were typical mani-

(Continued from previous page)

is clear from the table that the patients who were given smaller doses of the drug (0.5 gm. three times a day for five days) were relieved of their symptoms and the blood also was negative for malaria parasites, but the patients relapsed during their stay in the hospital. No relapse, however, occurred in those patients who received the higher dose.

A few untoward effects were, however, noticed, but they were of a very mild character. Beyond a slight epigastric distress and flatulence, no toxic effects were recorded.

Summary and conclusions

M. & B. 693 in doses of 4 gm. daily for five days cause disappearance of malaria parasite from the peripheral blood and controls the symptoms of the disease. (2) It destroys both the asexual and sexual forms of *P. vivax*, but only the asexual forms of *P. falciparum*. (3) In smaller doses the symptoms of the disease abated and the parasites too disappeared from the peripheral blood, but recrudescence of the disease occurred within a fortnight. (4) M. and B. 693 undoubtedly possesses mild anti-malarial properties in infection with Indian strains of malaria and is worthy of trial when other anti-malarial drugs are not available, or are contra-indicated. The present series is very small and further investigations are therefore desirable.

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festations at 6 months, but the patients are usually about 3 years old before the disease is diagnosed, and they usually die before the age of 10, but Ordway, Gorham and Isaacs (1937) reported a child aged 11 years who was still alive.

Clinical picture.—The patient has a very characteristic appearance: the features are described as Mongolian, on account of the thickening of the cranial bones and of the prominence of the malar eminence. Added to this is a peculiar yellowish muddy tint of the skin. The pigmentary changes which occur are similar to those in hæmochromatosis.

The spleen is always enlarged, usually markedly. The liver is usually palpable and the lymphatic glands are often slightly enlarged.

There are other signs and symptoms of anæmia. There is sometimes high irregular fever, suggesting an acute infectious process, but this is apparently due to the anæmia, as it disappears after blood transfusion.

The disease tends to run a chronic but steadily progressive course. Hæmolytic crises do not occur. Spontaneous fracture of the rarefied long bones has been reported.

Radiological features.—The long bones and small bones of the hand and foot are porous-looking, with sharp trabeculations and thinning of the cortex. The flat bones of the skull show medullary thickening, while the tables are usually thin. The profile of the skull gives the appearance of a surface studded with small radiating spicules (Vaughan, 1934).

The bony changes in the skull are most noticeable in the parietal and frontal bones, to a less extent in the occipital, and are usually absent from the temporal.

These bony changes are said not to be specific and to occur in achloruric jaundice (Friedman, 1928), and in sickle-celled anæmia (Vogt and Diamond, 1930) but we have only seen these extreme degrees of diploic thickening reported in Cooley's anæmia.

Blood picture.—It is a leuco-erythroblastic anæmia. The anæmia is often extreme, and the hæmoglobin may be as low as 1.4 grammes per cent (about 10 per cent Haldane) with the red cells at about 1,700,000 per c.mm.; that is to say, it is a hypochromic anæmia. The most striking feature in the blood picture is the large number of nucleated red cells, mostly normoblasts; there are frequently more nucleated red cells than leucocytes. There is usually a persistent leucocytosis of about 13,000 to 20,000 per c.mm. with only a few immature cells. Despite the hypochromia the mean red cell diameter is said to be about normal, but there is a high coefficient of variability. This is well shown in the Price-Jones curve of the case of Moncrieff and Whitby (1934), but the curve given by Vaughan (*loc. cit.*) shows a low variability.

The van den Bergh reaction is positive and the icterus index high. There is a considerable increase of urobilin in the urine.

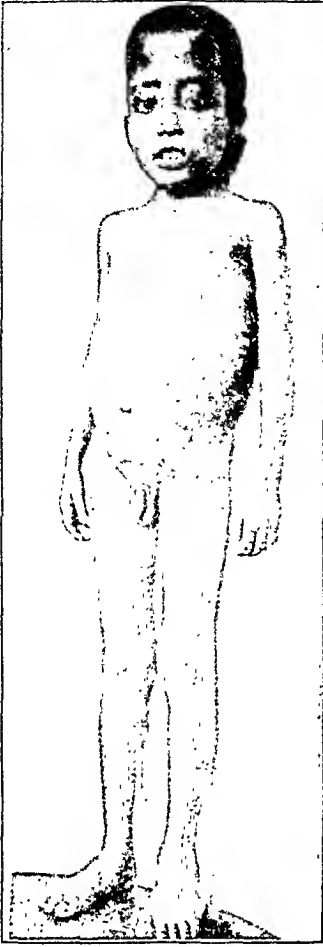


Fig. 1.



Fig. 2.

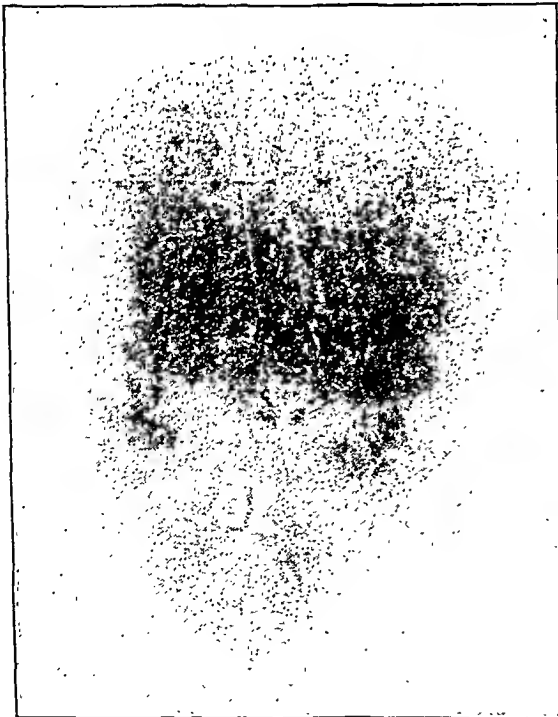


Fig. 4.—Antero-posterior: plate in nose-forehead position. Fig. 5.—Antero-posterior: plate in nose-chin position.

In the bone marrow there is leuco-erythroblastic hyperplasia. There are numerous primitive cells of the erythrocyte series, but not many normoblasts, nor myeloblasts; there are usually a number of megakaryocytes. There is a considerable increase in the hæmopoietic bed.

Nature of the disease.—Erythroblastic anæmia is apparently a primary dysfunction of the blood metabolism, probably congenital, in which the hæmolysis is a secondary factor (Cooley and Lee, 1932). The cells formed by the marrow are defective and probably qualify more quickly than ordinary red cells for normal hæmolysis.

Differential diagnosis

Osteitis deformans (Paget's disease).—This is only mentioned because it was actually suggested, surprisingly by a radiologist, although every radiological feature is against this diagnosis. In Paget's disease, the cortex of the bones is widened and encroaches on the medulla; the regular bone lamellar structure is replaced by a solid mass of varying density; and there is irregular alternation of sclerosis and areas of rarefaction.

Added to this, osteitis deformans does not appear before the age of thirty and usually much later, and there are no characteristic blood changes.

Sickle-cell anæmia.—In this disease, in addition to the abnormality in shape of the blood cells, hæmolysis is the most important feature, and the hyperplasia, which is orderly, is only the result of a demand to compensate for the excessive hæmolysis; there is a high reticulocyte count but not a great number of normoblasts.

Congenital hæmolytic anæmia and achloruric jaundice.—The state of affairs is much the same as in sickle-celled anæmia, but whilst the cells are of normal shape they are more fragile.

Von Jaksch's disease.—Cases of Cooley's anæmia have undoubtedly in the past been included in the von Jaksch syndrome, but Cooley differentiated this disease by the very striking bony changes, by the lower leucocyte count and the very small number of immature cells, and by the greater number of normoblasts.

Case note

The patient attended the anæmia out-patient department of the Calcutta School of Tropical Medicine, where a provisional diagnosis of Cooley's anæmia was made by the junior writer (C. R. D. G.), and the child admitted into the Carmichael Hospital for Tropical Diseases under the charge of the senior writer (L. E. N.).

Hindu male, aged 10 years, weight 40 lb., height 3 feet 9 inches, the first-born child of healthy parents, belonging to a cultivator family living near Calcutta. He has two healthy younger sisters, aged 5 and 3 years, respectively.

He is said to have had a big head since birth. He was quite well up to the age of about 7 years when he had low intermittent fever associated with enlarged spleen and liver; for this he was treated with nine intravenous injections—probably antimony—with partial success, inasmuch as both the spleen and the liver were diminished considerably in size, and the

fever came only in bouts at intervals of several days and was shorter in duration and not as high as before.

For the last 15 days his parents had noticed the yellow coloration of the eyes and therefore brought him to the hospital.

The peculiar facial expression, the unusually big head (figures 1 and 2), the yellow tint of the conjunctivæ struck one immediately.

On examination the boy appeared to be anæmic. The pulse was soft and fast, 110 per minute. The tongue was clean, teeth good and there was no bleeding from the gums. No abnormality was detected in the heart or lungs. The abdomen was protuberant, the spleen was $4\frac{1}{2}$ inches and the liver about $1\frac{1}{2}$ inches below the costal margin. There was no œdema of the lower extremities. The knee jerks were normal and there were no sensory disturbances.

Laboratory findings

Blood.—The blood picture showed a microcyte hypochromic type of anæmia with a high reticulocyte count (7 per cent). The differential white count showed 59 per cent of polymorphonuclears, 36 per cent of lymphocytes, 1.5 per cent of large mononuclears, 1.5 per cent of eosinophiles, 1 per cent metamyelocytes, and 1 per cent neutrophil myelocytes. Normoblasts numbered 34 per 100 leucocytes.

At a subsequent count (1st September) the large mononuclears had increased to 6 per cent and the eosinophiles to 10 per cent at the expense of the polymorphonuclears.

There was marked polychromasia.

Other details of the blood counts are given in the table I.

Price-Jones curve (figure 3).—Mean diameter— 6.56μ . Standard deviation— 1.02μ . Co-efficient of variation—15.5 per cent. Mean corpuscular thickness— 2.17μ .

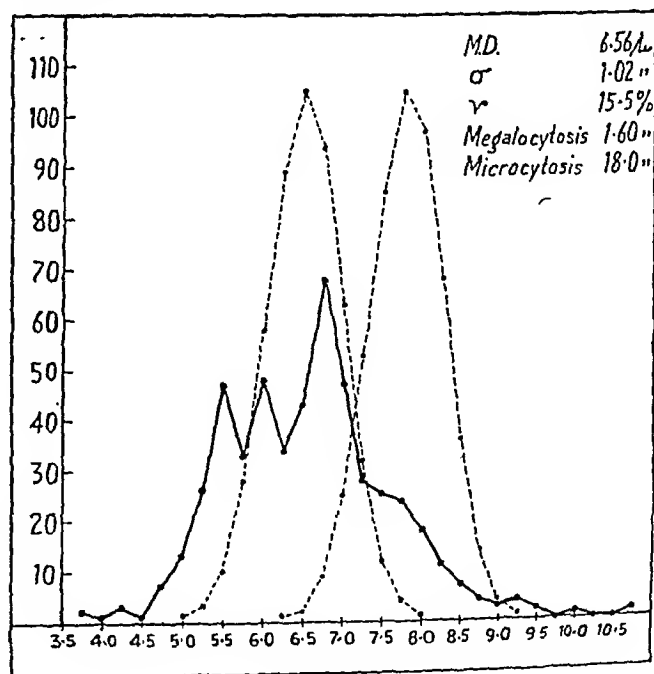


Fig. 3.

Van den Bergh—direct—negative, indirect—3.5 mgm. per cent.

Fragility of red blood cells. Beginning of hæmolysis at 0.4 per cent solution; complete hæmolysis at 0.3 per cent solution.

PLATE XXV

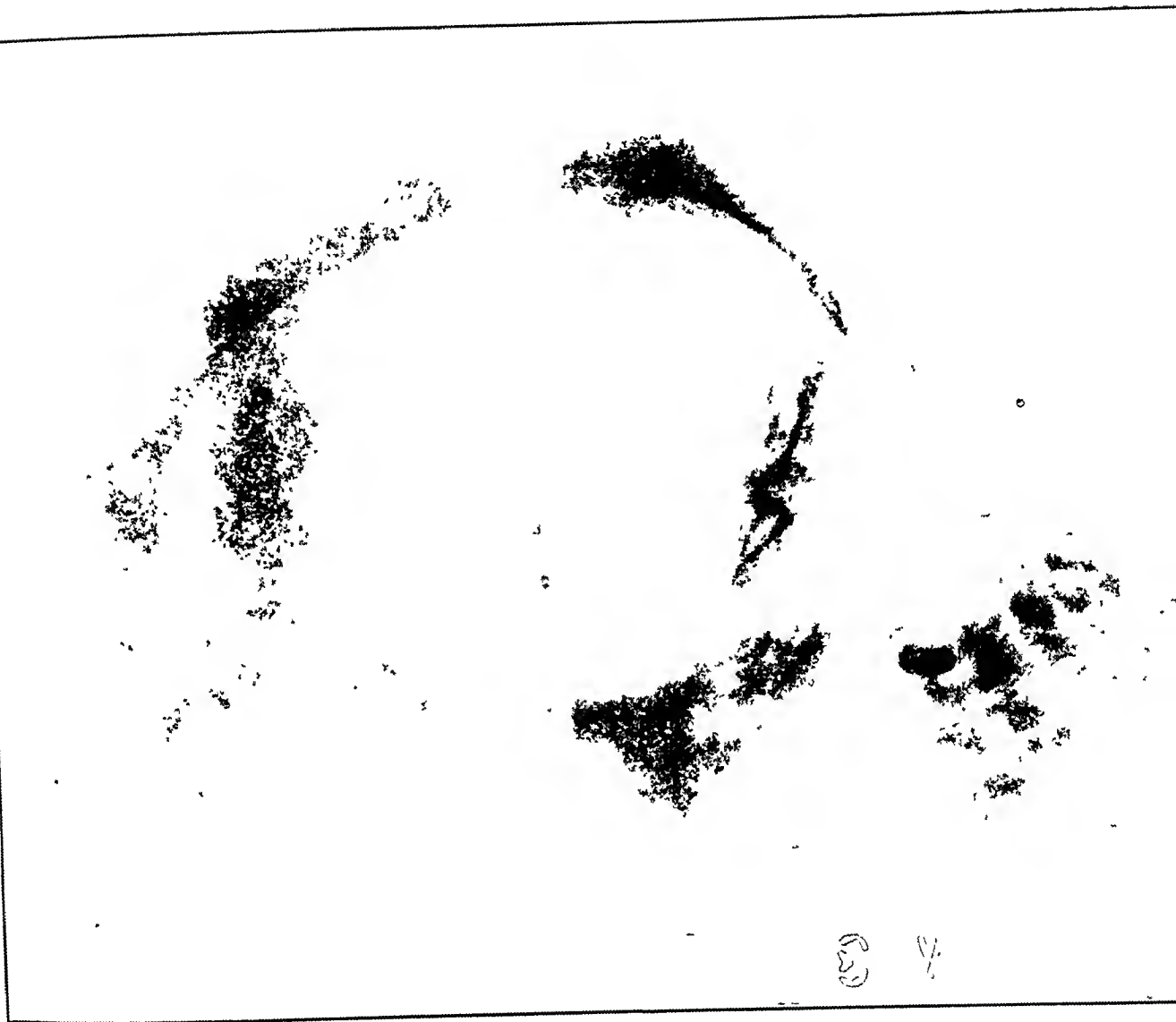


Fig. 6.

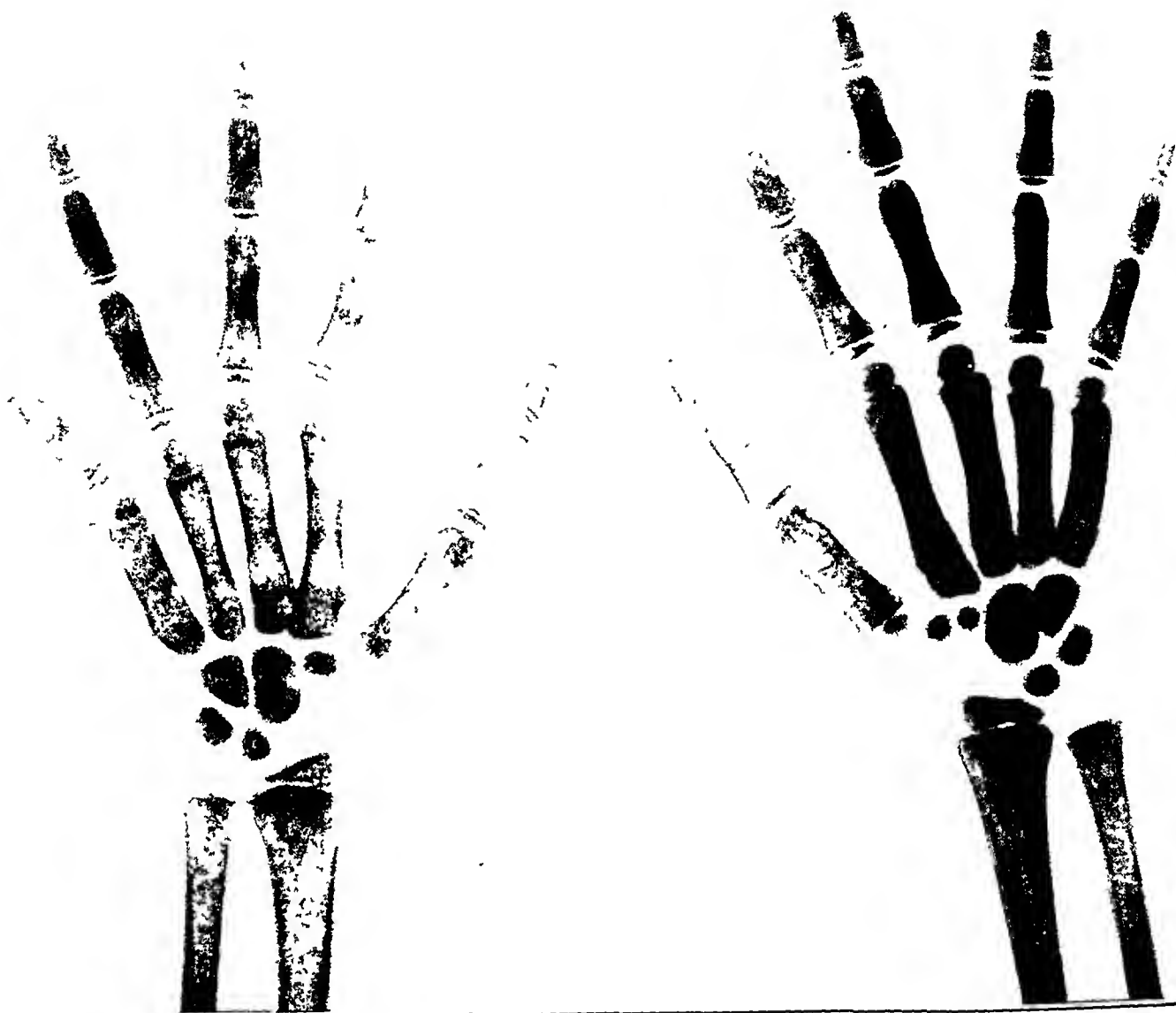


Fig. 7.

TABLE I

Date.	Hæmoglobin in grammes per 100 c.cm.	Red blood cells in millions per c.mm.	Reticulocytes per cent	Cell volume per cent	Mean corpuscular hæmoglobin in cu. μ	Mean corpuscular hæmoglobin, in %	Mean corpuscular hæmoglobin concentration per cent	White blood corpuscles per c.mm.	Bilirubin mgm. per 100 c.cm.	Nucleated red cells per 100 leucocytes
9-7-39	5.08	2.99	7.0	21.9	73.3	16.7	22.7	8,774	..	36
24-7-39	5.36	3.28	13.0	23.8	72.1	16.4	22.7	5,261	3.5	53
4-8-39	7.01	4.36	16.0	28.0	66.5	16.1	24.3	9,750	2.0	42
11-8-39	6.87	4.47	13.0	27.7	62.0	15.3	24.8	10,602	2.5	43
18-8-39	7.43	3.75	18.0	29.0	72.0	19.7	25.6	10,893	2.5	27
25-8-39	7.42	3.91	11.0	32.0	81.8	18.9	23.2	10,138	2.5	29
1-9-39	7.15	4.46	15.0	30.0	67.3	16.0	23.8	10,500	1.5	36
8-9-39	7.15	4.26	9.0	29.0	68.0	17.0	24.7	11,390	2.0	14
15-9-39	8.80	4.95	11.4	30.0	60.6	17.7	29.3	18,578	2.25	6
22-9-39	6.60	4.91	8.3	29.0	58.7	13.9	23.7	19,190	2.0	5
28-9-39	8.80	4.10	15.0	29.5	71.9	21.4	29.8	18,144	1.5	4

Coagulation time—3 minutes by the capillary method.

Wassermann reaction—negative.

Cholesterol—120 mgm., and serum calcium—11 mgm. per cent.

Sternum puncture.—The bone felt as if there were a thin shell surrounding soft, almost fluid, tissue; the needle after piercing this shell encountered no resistance. The puncture material showed a very active marrow, with a total nucleated count of 383,500 per c.mm., which was markedly normoblastic—with a fair number of macroblasts. Further details are given in table 2 below.

Gastric analysis.—Free hydrochloric acid was present in the fasting juice in normal amounts (\approx 20 c.cm. N/10 HCl). The boy would not keep the tube down and no further samples were taken.

Urine.—Urobilin markedly increased; no other abnormality.

Stool.—Normal. No helminthic ova nor protozoa seen.

Treatment.—Ferrous sulphate, grs. 6, twice daily was given for three weeks from 29th July to 20th August, and liver extract (Lilly) 2 c.cm. on 2nd, 3rd and 4th September.

The hæmoglobin percentage increased after the iron administration, but showed no further improvement when liver was given. A transfusion of 200 c.cm. of blood was given on 22nd September. The improvement in the blood picture was only slight.

TABLE 2
Sternal puncture

	Per cent of nucleated cells
<i>Red cell series</i>	80.875
Megaloblasts	..
Erythroblasts	.. 1.25
Macroblasts	.. 1.875
Normoblasts	.. 10.625
<i>White cells</i>	67.125
<i>Granular series</i>	15.375
Myeloblasts	.. 0.0
Premyelocytes	.. 0.0
Neutrophil myelocytes A	.. 0.56
" " B	.. 4.75
" metamyelocytes	.. 0.56
" band forms	.. 8.0
" segmented forms	.. 0.25
Eosinophil myelocytes	.. 0.5
" metamyelocytes	.. 0.25
" band forms	.. 0.56
" segmented forms	.. 0.0
<i>Non-granular series</i>	8.75
Lymphocytes, small	.. 3.75

Other lymphocytes, monocytes, premonocytes, megakaryocytes, plasma cells, or basophils were not seen.

Report on x-ray examination (by J. A. S.).

The following parts were x-rayed—skull, lumbo-sacral spine, pelvis, and forearms and hands.

The skull showed the following changes:—Marked increase in density and thickness of the

(Continued at foot of next page)

STERNAL PUNCTURE IN KALA-AZAR

By D. GOVINDA REDDY, M.D.

and

R. SUBRAMANIAM, M.B., B.S.

(General Hospital, Madras)

A NUMBER of publications dealing with sternal puncture in the diagnosis of kala-azar have appeared in the past few years. Unanimity of

(Continued from previous page)

vault affecting the diploic layer and the outer table mainly. The inner table does not appear to be affected. The thickened bone shows vertical striations throughout. There are no areas of sclerosis and rarefaction, such as are seen in Paget's disease.

These changes are practically confined to the frontal, parietal, and occipital bones. The temporal and facial bones appear to be normal, except for evidence of the general osteoporosis mentioned below.

The bones of the spine, pelvis, limbs, and extremities show a generalized halisteresis (figure 7) with marked thinning of the cortex and destruction of some of the trabeculae, giving rise to a stippled appearance of the cancellous tissue, quite different from the appearances seen in Paget's disease.

There are no cystic formations, bending of the weight-carrying bones, nor pathological fractures.

Summary and conclusions

The clinical picture, the blood findings and the radiological features conform more closely to the published descriptions of Cooley's anaemia than to those of any other disease.

The patient is older than is usual in this disease, but is not the oldest case reported. We do not know of any previous report of an authentic case of Cooley's anaemia in an Asiatic.

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opinion with regard to the value of the method is, however, lacking.

Vaughan (1938) states that parasites in leishmaniasis may be demonstrated more readily in smears of sternal marrow than by any other method.

Napier (1938, 1939) in a long series of cases found the method useful but inferior to splenic puncture.

We have been carrying out sternal puncture with Salah's needle as part of routine investigation of anaemia in the wards of the professor of medicine, Madras Medical College, for some months and have taken the opportunity of investigating 11 cases of kala-azar.

In two cases, prolonged search of several slides (extending over two hours) failed to reveal the presence of Leishman-Donovan bodies. The parasites were readily demonstrated in splenic puncture.

The table gives the list of the findings in these cases.

In most cases the findings of leishmania in the marrow smears was a time-consuming and tedious process, whereas the parasites could readily be found in splenic puncture.

Although leishmania bodies were scantily present in the marrow smears of cases 10 and 11, spleen punctures were made for demonstrations to the class, and the difference in the ease of finding the parasites was very striking.

In case 9, the diagnosis depended on spleen puncture. A male Hindu, aged 25, from an endemic area. History of fever of 14 days' duration. The spleen was just palpable. The aldehyde and antimony tests were negative. Sternal puncture negative, after prolonged search. Spleen puncture showed numerous parasites.

Summary and conclusions

In a small series of cases it was found that in 2 patients suffering from kala-azar, leishmania bodies were not demonstrable in sternal puncture though abundant in splenic puncture.

The method is time-consuming and tedious, although safer and requiring less preparation and after-care than splenic puncture.

A negative sternal puncture should therefore lead to spleen puncture in doubtful cases with equivocal biochemical reactions.

Our thanks are due to Lieut.-Col. G. R. McRobert, I.M.S., Professor of Medicine, Madras Medical College, in whose wards the investigations were carried out.

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TABLE

Case	BIOCHEMICAL TESTS		PARASITE FINDINGS IN PUNCTURE FLUID		Duration of disease in months	SIZE IN INCHES BELOW COSTAL MARGIN	
	Aldehyde	Antimony	Sternal	Spleen		Spleen	Liver
1	+	+	—	+	1	3	+
2	+	+	+	Not done	3	4	3
3	+	+	+	" "	4	1½	—
4	—	+	+	" "	4	3	2
5	—	—	+	" "	Indefinite history.	4	2
6	+	+	+	" "	3	6	3
7	—	+	+	" "	1	1½	—
8	+	+	+	" "	3?	2½	½
9	—	—	—	+	1	1	½
10	+	+	+	+	1?	2½	2
11	—	+	+	+	4?	4½	3

EARLY SCHIZOPHRENIA

By M. TAYLOR, M.D., D.P.H.
MAJOR, I.M.S.

Medical Superintendent, Ranchi European Mental Hospital

In these days the constant stream of writings on schizophrenia has served to indicate the rapid progress which is being made in this field of psychiatry. The introduction of cardiazol and insulin therapy constitutes a unique scientific revolution in an age of revolutions. The statistics of any mental hospital will bring home to the serious thinker the vast importance of schizophrenia. The schizophrenic-reaction types constitute over fifty per cent of the population of these hospitals, and, measured by the loss of time and money, it would be almost impossible to estimate the morbidity of the disease. The reports of practically all mental hospitals invariably reveal the fact that the vast proportion of the schizophrenics who come to hospital are well advanced in their psychosis, and, in many cases, so far advanced that a hopeless prognosis is inevitable.

The medical student fortunately need no longer look for his psychiatric material exclusively in the mental hospital. There is a movement which is slowly gaining impetus to handle some of our psychiatric problems in general hospitals, in the schools, and in the courts. The student will soon discover that a great number of diseases, which begin strictly as problems of general medicine, soon overflow into the channels of psychological medicine. Take, for example, typhoid fever. There are, in this condition, certain symptoms which cannot be measured by

observation, palpation, percussion, or auscultation, nor by the test-tube nor microscope. These symptoms may be defined as the reaction of the individual to the infecting organism. In bedside teaching the student will frequently complain that the patient is not like the general descriptive picture in the textbook. The complete clinical case is rare in reality, and in the schizophrenic-reaction types, the most difficult psychoses to comprehend, he will find it extremely hard to identify early evidence of the disease.

In the present decade the treatment of schizophrenia by cardiazol-convulsion therapy has been extensive in all European and extra-European countries, and statistics of some 5,000 cases which have been collected, indicate that full remissions can be achieved in 50 per cent of recent cases (duration of illness 12 to 18 months), and a point of no little economic importance is the shortened sojourn of patients in hospital. All authorities are agreed that the prospects of success diminish in ratio with longer duration.

There is no short road to the understanding of human reactions, and it is only after years of training and experience that the physician can deal adequately with personality disorders. The recognition of incipient schizophrenia is however becoming increasingly important to the general practitioner. Numerous excellent books on the subject are available, some dealing with Indian conditions, but their size and price place them beyond the scope of the average private library, and it is with this consideration in mind that I propose to attempt to set forth in simple

language some of the symptoms of early schizophrenia.

Cameron (1938) in a recent and excellent paper on early schizophrenia, gives two tables on the behaviour changes in schizophrenia. In the first table he enumerates the non-specific early symptoms in terms as used by the relatives. The symptoms are divided into two main groups—those characterized by the hypofunction, and those in which hyperfunction was dominant.

TABLE I

Non-specific early symptoms

Terms used by relatives to describe patients' behaviour synonymous terms in parenthesis.

Elements of a hyperactive pattern

Nervous (restless, tense)	Moody
Sleepless	Impatient
Worried (uneasy apprehensive)	Tantrums
Nightmares	Fault-finding
Hypochondriasis	Moralizing
Somatic complaints	

Elements of a hypoactive pattern

Seclusive (withdrawn, quiet)	Depressed.
Day-dreaming	Lack of energy
Pre-occupied	Lack of concentration
Loss of friends	Fatigue (weariness).
Irritability	Poor appetite
Loss of interest (of ambition)	

In the second table he enumerates what he describes as the early specific schizophrenic symptoms.

TABLE II

Early specific schizophrenic symptoms

Talked about	Ideas of disgrace
Watched	Idea of redemption
Doped	Supporting hallucinations
Fears of violence	

GROUP (II)

Ideational responses

Somatic experiences	Psycho-somatic experiences
Dazed	Screaming and giggling
Dizzy	Speech tantrums.
Lack of feeling of familiarity	Failure to co-operate in eating, talking or moving
Odd somatic experiences	

It is generally recognized that there are four types of schizophrenia—simple, hebephrenic, catatonic and paranoid, but transitions from one clinical form to another are common.

(1) The simple types are characterized by defects of interest, gradual development of an apathetic state, often with peculiar behaviour, but without expression of delusions or hallucinations.

(2) The hebephrenic types show a tendency to silliness, smiling, laughter, grimacing, mannerisms in speech and action, and numerous peculiar ideas usually absurd, grotesque and changeable in form.

(3) The catatonic types display a prominence of negativistic reactions or various peculiarities of conduct with phases of stupor or excitement, the latter characterized by impulsive, queer or stereotyped behaviour and usually hallucinations.

(4) The paranoid cases are characterized by a prominence of delusions, particularly ideas of persecution or grandeur, often connectedly elaborated, and hallucinations in various fields.

The following are illustrative cases taken from the notes of four early cases which came under my care in the Ranchi European Mental Hospital.

Case 1.—Male, Indian, aged 19, early schizophrenia (simple).

Family history.—Father and mother alive and in good health, three brothers had brilliant university careers and hold good appointments. One sister in good health and is married. No insane, epileptic, or intemperate relations known.

Personal history.—Seen January 1938. Bacillary dysentery at the age of 4; tonsils removed five years ago; nothing else important.

Physical condition.—Good, nothing important abnormal.

Wassermann reaction negative.

Onset.—The father, a very intelligent man, could give a very typical history of early simple schizophrenia. He stated that the boy had entirely changed during the past six months. He did very well at school and matriculated in the first class, and was attending university. His habits were solitary and seclusive and he studied or appeared to study very hard—did not play any games, nor did he mix with individuals of his own age. He became bad tempered, irritable, and had fits of depression, could not concentrate on his studies and became quite apathetic. There were occasional attacks of excitement, after which he was confused. He became emotionally dull, and lost all affection for the members of the family. His ambition went, and he gave no thought for the future.

Mental examination.—Appeared indifferent to his surroundings, facile, and showed no gross oddities of behaviour. Perception and cognition were good, and the memory both recent and remote was fairly good. No delusions, no hallucinations. Mild ideas of reference; thought people talked about him, and were passing remarks that he was not as good as his brothers, and that he was 'no good' for anything. Could discuss politics and knew all the famous political men. Says he was a student when a student, but was no longer a student and objected to work in the occupational therapy department—could not concentrate on jig-saw puzzles. This is a fairly typical case of early simple schizophrenia. The course in the hospital was uneventful. The patient co-operated well and was discharged recovered after six months' treatment.

Case 2.—Female, aged 23—European—schizophrenia (hebephrenia).

Family history.—Bad: Father a drunkard; divorced; mother married a second time, was unable to give any family history regarding the patient's father, but stoutly asserted that there never had been any insanity in her own family. The patient was the only child of the first marriage. The first child of the second marriage is an imbecile. The second child reported to be normal, and doing well at school. The patient had always been pampered and had had her own way, but all seemed to be well until the step-father fell in love with her. The home thereafter provided an excessively erratic environmental condition, and the mother made the shocking statement that the step-father had made immoral advances to the girl. So bad did matters become that the patient was sent to live with another family as a boarder. The mother continued 'It was out of the frying pan into the fire' for

the man in the new household also 'took advantage' of the patient on many occasions. This will suffice to indicate the circumstances under which the patient was brought up. She went to work as a typist—fell in love with her employer, and left, as there was no reciprocation. On arriving home her behaviour became very queer, and she developed odd delusions. Was brought to hospital for examination.

Mental examination.—She appeared precocious, defiant and self-assertive. An ardent conversationalist, but refused to give any co-operation while 'that woman' (referring to her mother) was in the consulting room. The mother withdrew. She then proceeded—'This brain (pointing to her forehead) was one of the best in the world at one time; now, it is empty; it will not function'. 'A nerve in my right arm has gone red-hot and has stopped the brain from functioning. My blood is all wrong; it is not circulating properly. It was such a good brain, and it is all his fault. I cannot tell you; it is all too horrible. This is a dreadful body of mine, but I cannot help myself'. On being pressed as to whose fault it was. She assumed the dramatic and said 'my step-father'. 'Since I was eleven years old he has almost daily handled my private parts. He has taught me sex perversion and I cannot help myself. It's sadism!'

There had undoubtedly been a bad moral history, bad sex practices, and perversions from an early age. There had been imperfect control all through adolescence. She formed liaisons with married men and would not listen to reason. Very definite mental conflicts about sex experience and her misbehaviour, but a complete absence of remorse. She says 'I'm modern and broad-minded'. The lack of success in her 'amours' is probably projected on to the step-father. Inhibition appears at times when she becomes emotional. Highly erotic.

Course in hospital.—Showed more or less emotional disturbance, but the mental ability was fair. Lodged many false complaints about cruelty. Conduct eccentric and the somatic delusions remained persistent for some time. Made a complete recovery after four months' treatment.

Case 3.—Male aged 28—European—early schizophrenia (catatonic type).

Family history.—One sister in a mental hospital. Seven sisters normal, one brother normal. Father and mother alive and well.

Personal history.—Normal birth and development, brilliant school and college career. Occupying a good position.

Physical condition.—Excellent physique, and nothing abnormal in any system, beyond constipation.

Personal history.—Was on duty until a few days before admission. There was a sudden burst of uncontrollable excitement in a busy street. He emerged from a shop where he had been conducting some business. He believed the passers-by were reading his thoughts and that they knew all his past history. Ran wildly up and down the street until he was taken for observation. Certified. On admission depressed, emotional, suspicious, and the certificates noted strong suicidal tendencies. Answered questions with much reluctance, but volunteered a statement that he was under the influence of the devil. Kept muttering 'Oh, Jesus Christ, have mercy on me'. Questioned further, he said, I am a very wicked man, and it is best that I should die'. After sedative treatment for a few days he became more communicative. His intellectual faculties were quite clear and he co-operated well in the examination. There were distressing sexual thoughts, syphilophobia, and feelings of shame. Stoutly asserted that he had never had sexual connection. There had been obvious failure to adjust his somatic and psychic sexuality, and he had been for some time ruminating over his habit of masturbation till the feelings of guilt became no longer bearable. Soon after this he had a relapse—asked the ward-boy for some vaseline—and there was shameless and frequent masturbation. Later, became depressed—the castration complex was present. He jumped out of bed, injured his scrotum to the effusion of blood and attempted to

injure his genitals. Reacted well to hydrotherapy. Acute mental distress developed, intense anxiety, and all sorts of phobias. Nocturnal frights became frequent, and he would wake up screaming, thinking he was in hell. The chaplain was asked to pay him visits, and these helped considerably. He displayed at this time alternate outbursts of maniacal excitement with fits of depression. He tried all sorts of devices to commit suicide, and it became necessary to place two attendants on him night and day. Hydrotherapy and sedation were given and a course of pyretotherapy (sulfosin) was commenced. Auditory and visual hallucinations to which he reacted were persistent. The voices he heard were extremely abusive. He would pray for long periods on end. He had very good reactions with the sulfosin and he gradually showed improvement. He was able to be out of doors and could take mild exercise. He soon discussed his conflicts, and the antics and cowering which were formerly present ceased. He now took his food well—although previously it was frequently necessary to resort to tube feeding. The mental state fluctuated, but he never really got out of his depression. At times there was anxiety and reticence, and he confessed to fearful ideas of reference, and very strong homosexual components. Would ask odd questions—such as why are nipples put on men, and why do pubic hairs grow on men? (he always shaved his pubic hairs). He told me at this period that he had been worried because there had been a rent in his camp bed and he felt sure some of his friends had put a wrong construction on this. A friend visited him at this time, and he was permitted to go for a motor ride with him. A very bad reaction resulted; on return from this outing he made a dash for the vegetable garden and made for one of the wells. Frustrated. Aggressive and resistive, but was persuaded to return to his room. Sedatives and rest in bed for some days with only slight improvement. Agitated, suspicious, and kept repeating 'I cannot understand it all'. Delusions of unworthiness and strong suicidal tendencies present. Continued to have very good reactions with sulfosin and again showed signs of improvement. Co-operation became excellent and he looked forward to psycho-therapeutic sessions. Commenced occupational therapy, and took a keen interest in the social side of the hospital activities. Soon took up the threads of his past—got in touch with his bank, and wrote long and interesting letters to his relatives. A complete review of his personal difficulties from an early age was begun, and gradually extended to a frank discussion of his delusions previous to admission.

Brought before the visitors' committee and was discharged. He asked permission to remain in the hospital as a voluntary boarder and was later granted leave by a medical board. After a complete rest in the United Kingdom he was able to resume his duties and has remained well for over two years. Duration of stay in hospital—five months.

Case 4.—Male, aged 30, early schizophrenia (paranoid type).

Family history.—Unobtained.

Personal history.—Brilliant school career. Did very well at the university. Was holding an important post. Towards the end of 1938, his work commenced to deteriorate, his memory became faulty, and he could not concentrate. Early this year he had an outburst of excitement with confusion. Certification was necessary. On admission his general attitude was suspicious, and he resented being questioned. There was no co-operation for a week, when he suddenly said to me 'I think I can trust you, but I shall require at least an hour to tell my story'. I arranged to meet him the following day. He was obviously in a state of panic. Commenced to give his life history from childhood. Nothing really important as regards illness. Whooping cough and scarlet fever in childhood. Harbours a strong resentment towards his father. Was his mother's favourite. Oedipus complex was unduly strong. Became sexually aware of himself at the age of 12. Had flirtations at school. Masturbation ++ from an early age. Admitted that he is an overt

homosexual. His homosexual tendencies are abhorrent to him, and have caused him a good deal of worry for a considerable time. Thought his weakness became known to some of his friends, there were ideas of reference, and he was being tortured by abusive voices. The voices he heard were not but that he had special powers.

He could transmit and receive messages from friends in Southern India by telepathy, etc., and remarked—'Don't run away with the idea that you are talking to a lunatic'. 'Let me tell you something'—'It was predicted by a Madame Blatavski that a certain person would be born—he would get an important post in India, he would pass through a period of tribulation, but that he would become the greatest man in the world'. (This person is himself.) He is full of his own importance, and says it will not be long before his powers will enable him to have direct telepathic communication with the Secretary of State for India. Went on to tell me that he had been a great social success, and that his charming manners and his ability to engage in clever conversation had made him very popular, and his presence at dinner parties always thrilled the whole company. Started writing lengthy letters to various high officials indicating that he would in due course be taking over a very important appointment. Soon became extremely suspicious of everyone. Complained that his letters were being read, and others not delivered; that his personal property was being interfered with, and that everyone in the hospital was conspiring against him. Completely devoid of insight. Would leave various articles lying about the room and then check them up, accusing the wardboys of stealing; would burn his letters in the boiler fire and then lodge a complaint that they had been removed from his room. Got a padlock and locks his room if he leaves it for a minute. Delusions became very prominent. The water and food were poisoned. He drew a tumblerful of water from the tap. Remarked 'Can't you see this water is all wrong. The specific gravity is too great—the water is oleaginous; it is poisoned'. I said 'let me have it, I'll drink it'. 'No, no', he replied, 'you would be dead in two minutes'. Threw the water away. Auditory hallucination continue to be persistent, and he was in daily communication with many people. Gave a lot of trouble with his food, became most inconsiderate to the staff, and if his wishes were not immediately complied with would demand that the superintendent be summoned immediately. Lodged many false complaints, and when investigations were made, would withdraw the charges verbally or in writing, and express regret. Proud, sensitive and still very suspicious, walks about the hospital with a very superior air, and reminds all that he is a superior individual. Demanded an interview from the committee of visitors. This was granted. Very annoyed because they did not issue orders for his immediate discharge from hospital (he is well conversant with the Lunacy Act). Made several attempts to abscond. Writing bombastic letters to his people, asking them to send full particulars regarding the 'family crest', etc., adopting an air of exaggerated dignity and condescension, and has become very aggressive to the staff, assaulted some of the wardboys. The mental condition continues to deteriorate, auditory hallucinations and delusions of persecution remain persistent. Says he is being impersonated and that his signature is being forged on cheques. Told me that I was being impersonated, and to be on my guard, etc.

The case illustrates a fairly typical case of the paranoid type of schizophrenia. Psychoanalysts find a homosexual trend in most patients who develop a paranoid state. The patient is still under treatment but the prognosis is not considered good.

The schizophrenic reaction types constitute beyond question the most important group of the psychoses. The notes from the case histories

(Continued at foot of next column)

LUNG ABSCESS

By MANGALDAS J. SHAH, M.B.C.P. (Lond.),
D.T.M. & H. (Lond.)

King Edward VII Memorial Hospital, Parel, Bombay

Introduction.—There are many points in the ætiology and treatment of lung abscess that are still not fully understood. Hence, the writer decided to study the records of the cases of lung abscess admitted and treated at the King Edward VII Memorial Hospital, Parel. The material consists of fifty consecutive clinical cases of lung abscess.

Hippocrates thought that lung abscess was caused by inhalation of blood and mucus, and that spontaneous recovery occurred on its rupture into a bronchus. In the 16th, 17th and 18th centuries, operation and drainage, through the intercostal spaces, were reported by eminent surgeons. Trousseau (Lockwood, 1923) was alone in advocating palliative measures in this era of radical surgery. This surgical mindedness towards lung abscess held the field till Murphy in 1898 analysed the position of surgery and exposed the defects and limitations of surgical treatment; since the day of Murphy, lung abscess is looked upon as a medical disease, requiring expectant treatment in the majority of cases.

There is no clear agreement even as regards the clinical definition of a lung abscess, since there is no distinct line clinically dividing lung abscess from lung gangrene. Some treat these two conditions as different clinical entities. Kline and Berger (1935) distinguish abscess from gangrene by the character of the sputum. They state that in abscess the sputum is whitish yellow, purulent, and contains pyogenic organisms, while in gangrene the sputum is brownish, very offensive and contains anaerobic spirilla, *B. fusiformis*, etc. Others depend upon

(Continued from previous column)

given illustrate the characteristic symptomatology. Early diagnosis and treatment may prevent an unfavourable outcome.

It is difficult to deal with such a vast subject within brief compass, but those who wish to venture further into the study of schizophrenia will find any of the following textbooks of great value :—

Textbook of Psychiatry—Bleuler.

The Principles and Practice of Neurology—(Cannon and Hayes).

Essentials of Psychiatry—(Henry).

Textbook of Psychiatry—Henderson and Gillespie.

A Manual of Mental Diseases—Lodge Patch.

REFERENCE

Cameron, D. E. (1938). *Amer. Journ. Psychiat.*, Vol. XCV, p. 567.

the pathological fact that an abscess is a collection of pus, while gangrene is a massive destruction of lung tissue. Clinically, the difference is only one of degree. Any circumscribed collection of pus in lung tissue, exclusive of pulmonary tuberculosis and bronchiectatic accumulations, is a lung abscess.

Ætiology

(a) *Age*.—The following is the age distribution in the present series of 50 cases :—

Years	Cases	Years	Cases
5-9	1	30-39	18
10-19	2	40-49	11
20-29	12	50-59	4
		60-63	2

The youngest case was of a boy aged 5 years and the oldest of a man aged 63 years. Out of 50 cases, 41, i.e., 82 per cent, fall within the age period 20 to 49 years.

Léon-Kindberg (1928) reported that 70 per cent of his cases were between the ages of 20 to 45 years; while Lockwood (1923) gave the greatest incidence of lung abscess between 25 to 40 years.

(b) *Sex*.—Out of 50 cases only 5 were female patients, showing a proportion of 9 males to 1 female. Léon-Kindberg reports a ratio of 3½ males to 1 female.

(c) *Site and distribution*.—The distribution in the present series was as follows :—

There were 5 cases of multiple abscesses and 45 of a single abscess. Of 45 cases, 31 occurred on the right side, and 14 on the left, giving a proportion of $\frac{\text{right}}{\text{left}} = \frac{2.2}{1}$. In the 45 cases of a single abscess, in 30 cases the abscess was located in the lower and in 15 cases in the upper lobe. Eleven abscesses were at the right apex and 4 at the left. Léon-Kindberg's report shows that there are 2½ times more cases on the right than on the left and that the location at the bases is 4 times more frequent than at the apices. Probably the preponderance on the right side is due to the anatomical relation of the right bronchus to the trachea.

(d) *Cause*.—In the present series the causes may be classified as under :—

A. Primary	21	cases	42	per cent
B. Secondary	29	"	58	"
1. Pulmonary infection (influenza, bronchitis, broncho-pneumonia, lobar pneumonia).	21	"	42	"
2. Chest trauma ..	2	"	4	"
3. Empyema ..	2	"	4	"
4. Aspiration ..	2	"	4	"
5. Embolic ..	2	"	4	"
(i) Cellulitis foot.				
(ii) Unknown.				

This grouping of causes has been arrived at after consideration of the history, physical signs and post-mortem evidence.

Flick, Clerk, Funk and Farrell report 172 cases of lung abscess, out of which 121 were post-operative, 43 were due to acute respiratory infection and 8 followed miscellaneous causes like injury, drowning and poisoning. According to Ascoli and Bonadies (1932) 50 per cent of lung abscess in the United States of America were post-operative. Most of the English authors state that the incidence of post-operative lung abscess is much less in Great Britain than in America.

The incidence in the present series is interesting in the fact that not a single case followed operations on the throat or mouth, in spite of so many throat and mouth operations being performed at the K. E. M. Hospital. Moore (1922) gives an incidence of 1 abscess in 2,500 tonsil operations, while Glowacki (1923) quotes an incidence of 1 in 356 tonsillectomies. General anaesthesia was used in these reported cases. At Mayo clinics where 16,000 tonsillectomies were performed under local anaesthesia only, 2 cases of lung abscess occurred. It may be justifiable to state that lung abscess following throat and mouth operations are not so common in Bombay. The reason for this difference from the experience in other institutions may be an inadequate follow-up of cases after operations, or to the fact that the difference is real and the incidence is really low. This difference can only be explained by further observations by operating surgeons. It may also be that the incidence from causes other than post-operative is greater than in the United States of America or in Great Britain.

Twenty-one cases out of 50, i.e., 42 per cent, have been reported as primary lung abscess in the present series. By primary abscess is meant that the first evidence of a morbid process is a suppuration in the lung tissue. Léon-Kindberg (1928) states that 50 per cent of his cases are primary lung abscess. In the primary lung abscess, perhaps some septic material passes down from the mouth to the throat and to the bronchus or bronchiole and sets up a suppurative process in the lung tissue. This inference of septic aspiration becomes more plausible since the micro-organisms, detected in the pus of lung abscess, resemble the normal aerobic and anaerobic bacterial flora of the mouth.

Twenty-one cases out of 50, i.e., 42 per cent, of the present series followed some pulmonary infection, such as influenza, bronchitis, or broncho-pneumonia. There are only 5 cases in which abscess followed lobar pneumonia. In the series reported by Flick, Clerk, Funk and Farrell, 43 cases out of 172 were due to an acute respiratory infection, 22 followed cold, 16 pneumonia, 2 broncho-pneumonia and 2 acute pleurisy. Edwards (1938) states that he has never seen a pneumococcal abscess following a pneumococcal pneumonia.

In the present series no serious attempt was made to study the predominant types of micro-organisms which were detected in the sputum.

However, in the few cases where a post-mortem examination was performed the following organisms were reported to be present :—

(1) Streptococci, (2) Pneumococci, (3) Staphylococci, (4) *B. pyocyaneus* and (5) *Bacillus fusiformis*.

Clinical

The mode of onset depends on the cause of the lung abscess. In primary cases the onset is sudden with fever, cough, with or without expectoration, hæmoptysis, and often pain in the chest. In post-pneumonic cases, the consolidation does not resolve and the fever persists. In one of the cases in the present series fever came down by crisis, remained normal for 4 days, and later developed into a septic type of temperature. In post-operative cases the patient develops fever, cough, pain in the chest, expectoration, hæmoptysis, and a leucocytosis after a lapse of about seven days. The sputum becomes abundant and foetid on about the 14th day. In the present series patients on admission to the hospital complained of the following symptoms, in order of their frequency :—

1. Fever	..	49 cases (1 case was afebrile).
2. Cough	..	42 "
3. Foetid sputum	..	29 "
4. Pain in chest	..	13 "
5. Hæmoptysis	..	12 "
6. Dyspnœa	..	5 "

Cough is perhaps the commonest symptom that draws the attention to the disease process in the lung. In the early phases, the cough is dry and unproductive, and is due to the irritation of the bronchi. A sudden severe paroxysm of cough may be the first indication of the bursting of an abscess into the bronchus. The paroxysms of cough may be repeated several times a day, particularly on change of posture, which causes some of the pus from the abscess cavity to flow down into a healthy bronchus and set up a reflex cough.

The expectoration in early phases consists of slight muco-purulent material from the bronchi. When the abscess opens into the bronchus, the material expectorated is frankly purulent. The foetid character of the pus depends on the presence of anærobic bacteria, e.g., *B. fusiformis*, Vincent's spirochaetes, etc., which may be the primary organisms, or the secondary invaders of the lung abscess.

Pain in chest depends on the peripheral situation of the abscess, due to an involvement of the pleura in the inflammatory process. The character of the pain is that of a pleural pain.

Hæmoptysis seems to be a common symptom of lung abscess. In the present series 12 patients (24 per cent) complained of coughing up of blood. Léon-Kindberg (1928) reports the presence of hæmoptysis in 24 per cent of his cases. In the early phases, hæmoptysis is due to a congestion round the inflammatory process.

Later on, it is due to an involvement of the blood vessels in the inflammatory process and their destruction.

Dyspnœa is usually present as a sign of general toxæmia but in some cases it is due to an involvement of a massive portion of the lung tissue.

Signs

There are no physical signs absolutely characteristic of the disease. The physical signs in a case of a lung abscess depend entirely on the situation of the abscess. In the case of a hilar or central abscess, there may be no physical signs, while in the peripheral sub-pleural abscess the local signs may be marked. Hence, physical signs by themselves have little value and should be interpreted in conjunction with other findings. The physical signs will be general and local.

The general signs noted in the present series are :—

(1) Fever. The height and range of fever varied from case to case. In a majority of the cases the fever was remittent or intermittent.

(2) Leucocytosis. A polymorphonuclear leucocytosis was observed in the majority of cases, where a leucocytic count was made. The highest count recorded is 30,000 white blood cells per c.mm. while the lowest was 3,900 per c.mm. The latter figure shows that in some suppurative processes an increased leucocytic response may be absent.

(3) Clubbing of fingers. Marked clubbing with drum-stick fingers is present in many cases.

The local pulmonary signs.—The following were noted during the examination of the case :—

(1) There were no signs of a localizing value in 12 cases. There need not be any localizing sign if the abscess is central or hilar.

(2) Signs of congestion and exudation in the alveolar spaces, as evidenced by an impaired note to percussion, with deficient breath sounds, were present in 16 cases.

(3) Signs of consolidation, that is, impaired resonance to percussion and bronchial or tubular breath sounds, were noted in 19 cases.

(4) Signs of cavitation, that is, impaired note to percussion and cavernous breath sounds, were noted in one case. The fact that the signs of cavitation were present in one case only is not surprising in view of the fact that an abscess cavity, as different from a bronchiectatic cavity, does not completely evacuate its contents into a bronchus.

(5) Signs of diffuse patches of consolidation were present in two cases.

(6) A pleural friction rub could be demonstrated in cases where the pleura is involved in the inflammatory process.

(7) Sputum.—The sputum derived from the bronchi during the first few days is small in

amount and muco-purulent in character. From the 10th to 14th day, a sudden large amount of expectoration is brought out, a fact indicating that the abscess has burst into a bronchus. The quantity brought out varies according to the size of the abscess cavity, and the frequency and the completeness of evacuation. The colour of the sputum is pale green, greenish brown, or black. The consistency may be thin or tenacious. Odour is foul and offensive in a majority of cases. On keeping the sputum in a conical glass, it separates into three layers, froth at the top, watery fluid in the middle, and sediment of pus and strands at the bottom.

X-ray.—There is no characteristic shadow by which lung abscess may be recognized. In the majority of cases there is a round shadow with a fluid level. In some cases an abscess cavity may be obscured by pneumonitis around it. If the pleura has been thickened, the abscess may be obscured and there may be a shadow with diffuse margins. Hence the interpretation of the radiological findings is to be utilized for confirming the diagnosis arrived at after a careful study of the history, the physical signs, and an examination of the sputum. In order to localize the site of the abscess, it is desirable to have both antero-posterior and lateral views. Such a localization of the abscess is very necessary in deciding the line of treatment to be adopted.

Lipiodol is not very useful since it does not fill the abscess cavity, but passes into other surrounding bronchi in the majority of cases.

Bronchoscopy may help in the diagnosis of a lung abscess following bronchial carcinoma or stenosis. It may also help to localize the abscess in relation to the bronchi.

Course and mortality

It is very difficult to arrive at a definite conclusion regarding the mortality rate, or recovery rate, from a small series of 50 cases. Out of the 50 cases, 20 died in the hospital. Out of these 20 deaths 3 died within 24 hours after admission (mortality of 34 per cent). Twenty-one cases are noted to have clinically recovered. Some of these recovered cases were controlled radiologically. The remaining 9 cases left the hospital against medical advice.

Summary

(1) Clinical records of 50 cases of lung abscess which were admitted at the King Edward VII Memorial Hospital, Parel, Bombay, are analysed.

(2) Though lung abscess is a common disease the above records do not show even a single case following operation on the nose, throat and mouth in contradistinction to the figures that are reported in American and English journals, where a high percentage of lung abscess following operations on the tonsils and upper respiratory tract are reported.

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STUDY OF DIET IN TWO INDUSTRIAL AREAS IN ASSAM, WITH SPECIAL REFERENCE TO THE INCIDENCE OF ANÆMIA*

By DURGA DAS MITRA, M.Sc., M.B., D.P.H.

The present dietary investigations were undertaken at the suggestion of Dr. L. E. Napier, Professor of Tropical Medicine, School of Tropical Medicine, Calcutta. Hæmatological studies had already been carried out at Labac (Cachar) and Jorehaut (Upper Assam) by Napier and Majumdar (1938) and Napier and Das Gupta (1937), respectively, among a number of women belonging to families of industrial workers in several tea-gardens; the object of the study of their diet was to find out if any correlation between the diet and these hæmatological findings existed.

Diet survey

Diet survey was done in 37 families in Labac (Wilson and Mitra, 1938) during July and August 1937 and in 35 families in Jorehaut during March and April 1938. The cases in which the hæmatological studies were carried out by Napier and his co-workers came either from some of these families or from others of similar status and dietary habits. Diet survey was carried out for periods of three weeks in every case, information about dietary intake being obtained daily by house-to-house visits. Average consumption of the more important

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(Continued from previous column)

I take this opportunity to thank Dr. Jivraj N. Mehta, the Dean of the King Edward VII Memorial Hospital, Bombay, for permitting me to go through the records of the hospital cases.

My thanks are also due to the honorary staff members who were in charge of these cases. I thank Professor Khanolkar for his help and guidance. I must particularly thank Dr. Namjoshi, a house physician, for his sincere and untiring help.

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foodstuffs per consumption unit per day was as follows :—

TABLE I

	Labac (Lower Assam)	Jorehaut (Upper Assam)
Rice (parboiled and mostly milled).	19.0 oz.	19.4 oz.
Pulses	1.0 "	0.9 "
Non-leafy vegetables ..	3.4 "	4.4 "
Leafy vegetables ..	0.2 "	0.8 "
Fish, eggs and meat ..	0.2 "	0.7 "
Mustard oil	0.3 "	0.3 "

Average intake of proximate principles, calories, minerals and vitamins per consumption unit per day (table II) have been calculated on the basis of the figures given in the *Health Bulletin* (Aykroyd, 1937) with the exception of vitamin B₆ and flavine, for which figures of Wilson and Roy (1938) have been used.

TABLE II

Average number of persons and consumption units per family, an average intake of proximate principles, calories, minerals and vitamins per consumption unit per day

Place of survey and number of families	Labac (Cachar), 37 families	Jorehaut (Upper Assam), 35 families
Number of persons	3.5	4.9
" " consumption units	2.5	3.5
Protein—total protein (g.) ..	58.8	63.8
" animal " (g.) ..	1.6	4.6
Fat—total fat (g.) ..	12.0	13.4
" animal " (g.) ..	0.4	0.9
Carbohydrate (g.) ..	458	497.9
Calories—total calories ..	2,181	2,329
" percentage from cereals.	88.9	86.5
Mineral matter—		
Total minerals (g.) ..	6.77	10.43
Calcium (g.) ..	0.17	0.27
Phosphorus (g.) ..	1.67	1.77
Ratio Ca : P ..	1 : 9.6	1 : 6.6
Iron (mg.) ..	18.77	27.79
Vitamins—		
Vitamin A (I. U.) ..	23	17
Carotene (I. U.) ..	995	1,593
Vitamin B ₁ (I. U.) ..	624	687
Flavine (mg.) ..	1.074	1.139
Vitamin B ₆ (rat units) ..	279	305
Vitamin C (mg.) ..	26	67

These average figures show that the animal protein, total fat (including animal fat), calcium, and vitamin A (including carotene) are deficient when compared to some recognized standards (table III).

The Ca:P ratio also appears not to be suitable for the proper absorption of either, and the dearth of fat in the diets seems to make it still more difficult for the already insufficient vitamin A and carotene to be properly absorbed. The vitamin-C figure refers to raw uncooked food, and therefore the amount actually consumed in the cooked food is doubtful; also the intake of raw fruits or vegetables is negligible.

Total iron and 'available' iron

'The iron in certain foods is less "available" than the iron in others' (Aykroyd, 1937). The available iron figures have been calculated (table IV) according to Ranganathan's data (1938).

Table IV shows that not a single family in Labac and only one in Jorehaut consumes iron, anything up to Sherman's (1937) standard of 12 mg. On the whole, the diets appear to be definitely deficient in available iron.

Further, many poor people in those areas cook their food in earthenware vessels; this prevents any accretion of iron to the cooked food, which, though uncertain in amount, does occur when iron pans are used. The health of the women is more adversely affected than that of the men, on account of the physiological factors of menstruation and pregnancy, the latter is repeated in many cases at short intervals in those areas.

This deficiency of 'available' iron entirely tallies with the findings of Napier and his co-workers. In fact, in Labac, the population of pregnant tea-garden coolie women, as a whole, were observed by them to have a low level of hæmoglobin, associated with a small pale red blood cell, and in Jorehaut, in 100 cases of anæmia studied by them, there was no case of the pernicious type, and with very few possible exceptions, they were all cases of the microcytic, hypochromic, iron-deficiency type.

Discussion

The absorption of iron depends on the acidity of the gastric juice, but in Jorehaut, Napier and Gupta (*loc. cit.*) found the incidence of achlorhydria lower in the anæmic group than in the normal population. Thus this point may be ruled out in the present case.

Orten, Smith and Mendel (1935) showed that an increased intake of calcium improved the utilization of iron in normal blood formation, and the deficiency of calcium in the present diets may be another factor at fault in relation to anæmia.

Copper again helps utilization of iron in the body (Barer and Fowler, 1937; Hutchison, 1938; Canelli, 1937), and Napier used ferrous sulphate with minute quantities of copper sulphate added, for the iron therapy (private communication). No definite figures for copper are, however, known as yet for the common Indian foods.

Several cases of goitre were seen in Jorehaut, which possibly indicate a deficiency of iodine in

TABLE III

Average intake of certain dietary principles per consumption unit per day in Labac and Jorehaut, compared with some recognized standards

	Labac	Jorehaut	Health Bulletin (1937)	Sticbeling (average per head). (Sherman, 1937)	Sherman (1937)
Protein—total (g.)	58.8	63.8	65	68	1 g. per kg. body-weight.
„ animal protein (g.)	1.6	4.6	20	..	..
Fat—total (g.)	12.0	13.4	45-60	..	..
Calories	2,181	2,329	2,600-3,000	2,800	..
Calcium (g.)	0.17	0.27	0.68-1	0.9	0.68
Phosphorus (g.)	1.67	1.77	1.0	1.23	1.32
Ca : P ratio	1 : 9.6	1 : 6.6	..	..	1 : 1
Iron—total (mg.)	18.77	27.79	..	..	..
„ 'available' (mg.)	4.61	6.73	..	13-14	12
Vitamin A	23	17 }	3,000	3,800	..
Carotene	995	1,593 }			

TABLE IV

Consumption of total and 'available' iron per consumption unit per day

Serial number of family	Labac (Cachar)		Jorehaut (Upper Assam)	
	Total iron (mg.)	Available iron (mg.)	Total iron (mg.)	Available iron (mg.)
1	24.80	7.45	33.77	7.97
2	20.73	5.01	15.50	3.82
3	14.46	3.98	36.76	8.14
4	24.89	5.03	48.93	12.55
5	14.67	4.18	28.84	7.72
6	14.78	3.61	36.30	8.49
7	16.27	4.19	24.11	5.38
8	12.06	2.77	31.19	7.24
9	15.60	4.06	19.86	4.94
10	16.25	4.04	35.54	8.39
11	20.60	5.34	18.81	4.23
12	7.15	1.52	29.92	5.48
13	22.58	5.89	25.15	5.66
14	19.60	5.31	22.08	6.49
15	21.53	5.26	43.33	10.82
16	29.40	6.45	22.61	5.42
17	30.90	7.10	23.24	5.61
18	20.50	4.82	29.83	7.11
19	14.00	3.50	21.48	5.28
20	22.80	5.75	33.29	8.23
21	19.00	4.80	23.17	5.30
22	25.90	6.57	23.06	6.85
23	21.60	5.91	22.87	5.57
24	18.87	4.57	24.64	6.05
25	16.40	3.94	28.51	6.06
26	16.30	4.20	36.40	10.00
27	14.80	4.27	22.97	5.59
28	12.90	2.74	23.50	6.08
29	24.80	5.38	38.36	8.82
30	16.00	3.66	19.89	4.88
31	12.80	2.93	18.36	3.93
32	24.70	5.33	21.00	4.96
33	19.00	4.81	25.81	7.27
34	21.80	5.37	40.72	9.78
35	12.27	2.97	22.96	5.42
36	14.40	3.63	..	..
37	19.03	4.43	..	..
TOTAL	694.84	170.77	972.76	235.53
AVERAGE	18.77	4.61	27.79	6.73

the water and/or soil. Deficiency of vitamin C and thyroxine are believed to cause general slowing of hæmopoiesis and may be partly responsible for the degree of anæmia in the present cases.

Napier showed that the blood picture in microcytic-hypochromic anæmia could not be improved by dietetic treatment alone, an observation corroborated later by Davidson and Fullerton (1938) who pointed out the importance of dietary iron in prophylaxis against anæmia but showed that this iron was not curative in 11 anæmic cases.

Summary

Dietary investigations were carried out amongst 37 families at Labac (Cachar) and 35 families at Jorehaut (Upper Assam) to find out if any correlation existed between the diet and the microcytic-hypochromic type of anæmia observed by Napier and his co-workers in those areas. The data on diet, when worked out, showed a great deficiency in available iron.

Acknowledgments

I thank Dr. L. E. Napier for making the arrangements for these diet surveys and Doctors G. Fraser and D. Manson, the chief medical officers at Labac and Cinnamara (Jorehaut), respectively, for whole-hearted co-operation and facilities during the field work.

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A DIET SURVEY IN BOMBAY

By S. P. NIYOGI, M.Sc., M.B.

Professor of Physiology, Seth G. S. Medical College, Parel, Bombay

and

D. R. SUKHATANKAR, M.Sc.

(From the Department of Physiology, Seth Gordhandas Sunderdas Medical College, Parel, Bombay)

THE present survey has been undertaken to obtain an idea of the food consumed by people resident in Bombay and to investigate their physical and clinical condition in relation to diet. A knowledge of the qualitative and quantitative composition of food is obviously essential for the proper application of the result of nutritional science to the practical problems of dietetics.

In this country a number of diet surveys have been carried out in different provinces. Wilson, Widdowson and Wait (1937) have worked on families in Northern India; Wilson, Ahmad and Mullick (1936) have surveyed some families and institutions at Calcutta. Aykroyd and Krishnan (1937) investigated some poor families in Southern India; Ahmad and Gore (1938) and Wilson and Mitra (1938) carried out a survey of some poor families in Ferozepore, Assam and Baraset, respectively. A diet survey of various classes of women in Bombay was made by Wills and Talpade (1930). It may, however, be stated that there is still a large mass of material available in Bombay which demands a more extensive dietetic and clinical survey for the guidance of life both in health and disease.

Subjects surveyed

The present communication deals with 46 poor class families consisting of 191 members, 16 middle class families comprising of 77 members and 6 different messes attached to the Seth G. S. Medical College and K. E. M. Hospital, Bombay, consisting of 223 persons. The enquiry is being continued in the poor, middle and rich class families belonging to different communities and useful information can only be obtained after an extensive survey has been made.

It has been found convenient to classify the families and messes that have been investigated into groups according to the amount of money spent on food per man value per month (table

I). Groups (I to V) are poor families having an average monthly income varying from Rs. 36 to Rs. 55. Families in group I come from Gujrat districts. The male and the female members in the majority of cases are in municipal service employed as sweepers. The members of families in groups II and III belong to Poona and Konkan districts. Male members are employed as office peons, or laboratory servants and the women folk in some of the families work in the mills. Group IV comprises members of Christian and Mohammedan communities and are employed as butlers in messes or as ward-boys in the hospital. Group V consists exclusively of Hindoo male members from northern parts of India. They are employed in the hospital as ward-boys and sweepers.

Groups VI and VII include middle class families with an average monthly income varying from Rs. 120 to Rs. 135. The male members are employed as clerks in the offices of the Seth G. S. Medical College and the K. E. M. Hospital. The six vegetarian families of this group are Deccanics and the remaining ten non-vegetarian families include Deccanics and Indian Christians. Groups VIII to XIII are the messes attached to the Seth G. S. Medical College and K. E. M. Hospital, Bombay. The students, resident medical staff and the nurses of the above institutions belong to different communities having separate messing establishments as shown in table I. The students draw an average monthly allowance of about Rs. 40 for boarding, lodging and pocket expenses. As regards the nursing and resident medical staff arrangements are made by the hospital authorities for free board and free quarters with uniform allowance in the case of the former, while the resident medical officers are also supplied with free quarters having a mess of their own. In the case of these staffs there can be no relationship between emoluments and amount spent on food as, while the grades of their respective salaries may be different, the food served in the respective messes is identical for all the members of each mess according as they are vegetarians or non-vegetarians.

Dietary habits

An idea of the dietary habits can be obtained from the figures given in table II.

Groups I to V.—The cereals consumed by these groups are rice and wheat. A few families take *javari* and *bajri* in addition. It will be seen from figures given in table II that the cereal food consumed by group I consists of rice and wheat, that by groups II, III and IV is composed chiefly of rice and that of group V consists chiefly of wheat. Pulses form the chief source of protein in the diet, meat, fish, eggs and milk being taken sparingly except by the Christians, Mohammedans and the Hindoos from provinces other than Bombay. The fats are

*(Continued from previous page)*Napier, L. E., and Majumdar, D. N. (1938). *Ibid.*, Vol. XXVI, p. 541.Orten, J. M., Smith, A. H., and Mendel, L. B. (1935). *Proc. Soc. Exper. Biol. and Med.*, Vol. XXXII, p. 1093.Ranganathan, S. (1938). *Indian Journ. Med. Res.*, Vol. XXV, p. 677.Sherman, H. C. (1937). *Chemistry of Food and Nutrition*. Macmillan Co., New York.Wilson, H. E. C., and Mitra, D. D. (1938). *Indian Journ. Med. Res.*, Vol. XXVI, p. 131.Wilson, H. E. C., and Roy, G. K. (1938). *Ibid.*, Vol. XXV, p. 879.

TABLE I

Group	Community	Number of families	Number of members	Man value	Diet	* Expenditure on food per man value per month	Monthly income per man value	Percentage of total income spent on food per man value	Average monthly income of the group
						Rs. As. P.	Rs. As. P.		Rs. As. P.
I	Gujrathi ..	10	53	39.6	Non-veg.	3 13 1	9 1 0	42	36 5 0
II	Deccani ..	10	40	32.9	Do.	4 7 7	12 6 0	36	40 11 2
III	Do. ..	10	36	30.0	Veg.	4 13 9	11 10 0	37	35 0 0
IV	Christian and Mohammedan.	6	25	22.8	Non-veg.	5 4 4	12 14 0	40	49 10 0
V	Hindoo (from Provinces other than Bombay).	10	37	37.0	Do.	5 12 4	14 14 0	38	55 10 0
VI	Deccani ..	6	26	21.0	Veg.	7 10 1	39 2 0	19	120 0 0
VII	Deccani and Indian Christian.	10	51	43.0	Non-veg.	7 11 2	35 5 0	22	135 0 0
VIII	Modern Club ..	..	19	19.0	Veg.	11 6 6	40 0 0	28	..
IX	Aryan Club ..	..	35	35.0	Do.	11 14 0	40 0 0	29	..
X	Nurses' Mess ..	..	35	35.0	Do.	14 8 6	..	..	..
XI	Gujrathi Club ..	..	35	35.0	Do.	15 10 0	40 0 0	39	..
XII	Nurses' Mess ..	..	61	61.0	Non-veg.	19 1 0	..	..	..
XIII	R. M. O's Mess ..	..	35	35.0	Do.	20 2 6	..	..	..

* The figures under this head do not include the cost of fuel and establishment charges.

TABLE II

The average diet of different groups per man value per day in ounces

Group	Rice	Wheat	Bajri, javari	Pulses	Meat, fish, eggs	Milk and milk products	Oil	Ghee	Sugar, jaggery	Coconut	Root and leafy vegetables	Fruits
I	6.5	7.3	Nil	2.4	0.7	1.5	0.8	0.06	1.6	Nil	4.1	Nil
II	16.2	0.08	"	2.6	0.9	0.6	0.9	0.02	1.2	1.2	7.5	"
III	12.4	1.5	0.9	2.6	Nil	3.5	1.5	Nil	2.5	Nil	8.4	"
IV	14.9	2.9	0.2	1.1	2.1	2.6	0.8	0.2	2.1	"	5.8	"
V	2.0	19.2	Nil	0.9	2.0	1.6	1.1	0.5	1.3	"	7.0	"
VI	8.9	2.4	0.1	1.8	Nil	14.8	0.8	0.9	2.9	1.2	5.8	"
VII	8.2	3.2	0.2	1.1	4.1	7.6	1.1	0.5	1.9	0.9	5.0	"
VIII	4.3	4.2	0.5	6.0	Nil	15.3	1.5	2.9	3.5	0.4	15.6	1.0
IX	5.1	4.0	0.8	3.6	1.6	19.6	1.4	1.6	2.0	1.4	12.0	5.8
X	8.5	6.7	0.4	4.4	Nil	21.4	2.0	2.6	3.0	1.4	14.4	6.0
XI	4.7	5.0	Nil	6.6	"	19.4	3.4	3.1	5.4	0.4	19.5	4.0
XII	4.0	10.6	"	1.5	9.0	13.5	1.0	3.4	5.2	0.7	16.5	5.0
XIII	5.6	7.7	0.3	0.9	9.6	22.1	2.3	3.1	3.7	0.8	22.8	7.8

derived mostly from vegetable oils, the consumption of ghee being insignificant. Fourteen out of the forty-six families investigated in these groups take no milk, while 20 families consume less than 4 ounces of milk per adult per day. Vegetables figure largely in the diets, although fruits are conspicuous by their absence.

Groups VI and VII.—The cereals and pulses used are of the same type as in groups I to V, but their consumption is in most cases less than in the latter groups. In the non-vegetarians of the group the intake of meat, fish, and milk products is higher than in the corresponding groups of poor families. The consumption of large quantities of milk by the vegetarians of this group is a characteristic feature. The quantity of oil and ghee is slightly in excess as compared to that in the diets of poor families. Fruits are not usually taken, but vegetables are

taken in the same proportion as in the poor family diets.

Groups VIII to XIII.—The various items entering into the composition of these diets are the same as in groups VI and VII, but these diets contain larger quantities of pulses and animal foodstuffs, such as meat, fish, eggs, milk, ghee and a liberal supply of vegetables and fruits.

Experimental

The survey of each individual family or mess was carried out for seven days. It is proposed to repeat the investigations in different seasons of the year in order to get an idea of any dietetic variations with seasonal changes, when different types of foodstuffs are available. The raw rations were weighed twice during the day before the two principal meals. The values for

the different proximate principles were calculated from the data given in *Food* by McCarrison (1920). The wastage before cooking and after service was analysed in the laboratory, and due allowance made for the daily loss. In the majority of the families, the wastage was negligible as the food left after one meal was utilized for the following meal. In the messes investigated wastage and leakage, specially of costly items of food, were by no means insignificant. The intake of minerals has been determined by actual analysis of cooked food in the physiological laboratory of the Seth G. S. Medical College. The family coefficients for finding out the consumption units are those suggested by the League of Nations (1936). The validity of the family coefficient method of assessing the family needs has been questioned by several observers, but the method is so convenient and useful that it cannot be discarded until a more scientific one is evolved. In the survey lasting for seven days, it so happens that some members of a family are absent from one or more meals and sometimes one or more visitors are at the house to participate in the meals. In calculating the consumption per man value, cognizance has been taken of the meals missed and of the extra participants.

Results and discussion

It will be convenient to give a summary of the results obtained and to discuss the points of interest in detail.

Protein.—The protein consumption is shown in table III. There is a good deal of controversy regarding the protein requirements of an

with higher protein content, are healthier and of better physique than those subsisting upon a more restricted protein intake. The British Medical Association Committee recommended 100 g. of protein of which 50 g. should be from animal sources. The Ministry of Health Committee has suggested an intake of 100 g. of total proteins and 37 g. of animal protein. The true protein intake of an average man in the tropics may be taken as midway between the two extremes and should vary from 70 g. to 100 g. of which 37 g. should be derived from animal sources. Judged from these standpoints the diets of the vegetarian families of the poor and the middle classes are deficient in the total proteins. This deficiency is all the more marked because the protein derived from the vegetable sources have a lower biological value and are less readily absorbed and assimilated than the animal proteins.

In all the diet groups except XII and XIII there is a deficiency of animal proteins. The inadequacy of the total proteins and animal proteins becomes less marked with increasing expenditure on food. The amount of protein consumed per man value per day is lowest with the smallest income groups and highest with the largest, but the amounts for the intermediate income are more or less the same.

Fat.—The fat intake per consumption unit per day is given in table III. The fats, quite apart from the fact that they furnish the fat-soluble vitamins, are essential elements in nutrition. Fatty foods contain besides neutral fat and fat-soluble vitamins, other substances which cannot be apparently synthesized in the

TABLE III

Group	PROTEIN (g.)		FAT (g.)		CARBOHYDRATE (g.)			Calories	MINERALS			
	Total	Animal	Total	Animal	Total	Cereal	Veg.		Ca (g.)	P (g.)	Ca : P	Fe (mgm.)
I	62.6	7.4	36.6	6.1	404	310	11.7	2,210	0.54	1.72	1 : 3.2	30
II	55.7	6.1	50.6	3.2	498	422	20.6	2,677	0.61	1.77	1 : 2.9	45
III	56.0	4.7	57.0	10.4	470	366	24.7	2,625	0.59	1.83	1 : 3.1	38
IV	69.9	16.8	45.8	12.7	500	418	18.2	2,726	0.61	1.69	1 : 2.7	36
V	101.0	15.8	58.1	18.1	486	443	19.0	2,892	0.76	2.04	1 : 2.9	42
VI	59.7	20.0	93.2	55.7	398	279	16.5	2,720	1.08	1.52	1 : 1.5	86
VII	70.4	35.6	79.1	37.0	368	284	13.0	2,499	1.01	1.43	1 : 1.4	93
VIII	70.7	16.8	140.0	108.7	408	208	44.9	3,183	1.20	1.29	1 : 1.1	130
IX	71.8	24.3	131.2	83.8	406	231	39.0	3,102	1.23	1.31	1 : 1.0	133
X	101.3	32.2	199.4	110.6	588	354	40.9	4,552	1.75	1.76	1 : 1.0	158
XI	78.4	22.0	203.9	120.5	489	225	56.9	4,117	1.18	1.28	1 : 1.1	106
XII	118.3	79.6	163.6	126.5	499	265	57.0	3,986	1.43	1.57	1 : 1.1	126
XIII	129.5	85.5	213.4	135.6	475	277	59.6	4,334	2.03	2.06	1 : 1.0	215

adult. Upon an ordinary mixed diet containing proteins of varying biological values, nitrogen equilibrium can be maintained on an allowance of 40 g. to 50 g. for a man of average weight. According to McCay the diets of the Japanese and the hardier races of India contain a greater quantity of protein than the minimum prescribed by Chittenden. McCay is of opinion that the tribes in India, which are accustomed to diets

body. Burr and his associates are of opinion that linoleic and linolenic acids are essential for normal nutrition and cannot be synthesized in the body. This view has not, however, met with universal acceptance. Another advantage of fat is its staying power. Its digestion is extended over a larger period than that of carbohydrates. Hunger, emptiness, and fatigue are experienced much sooner upon a diet rich in

carbohydrate than upon one containing a liberal supply of fat. The amount of fat consumed varies with the country, economic status, occupation, and season. The maximum fat content of the native diets of Japan is about 30 g. The Inter-allied Food Commission adopted 57 g. as the minimum fat ration during the war. The accepted standard of fat requirement in the western countries is 100 g. per day of which 50 g. is animal fat. The actual requirement for tropical countries has not been worked out, but it is probably not advisable to take less than 80 g. of total fat and 40 g. of animal fat daily. In poor families (groups I to V) the total fat and animal fat consumption is inadequate. The diets of the middle class families (groups VI and VII) contain sufficient amounts of total and animal fats and the institutional diets are rich in both of these items. With the rise of income there is a definite increase of fat consumption. Cathcart and Murray (1932) have reported a

body. It will appear from the figures given in table III that the carbohydrate consumption is within normal limits in groups II, III, IV, V, XI, XII and XIII; high in group X and low in groups I, VI, VII, VIII and IX.

Minerals.—The mineral intake is given in table III. The calcium intake is low in the diet of groups I to V. The Ca/P ratio in these diets is ill-balanced; this can be attributed to low consumption of milk and cereals, such as wheat. The Ca/P ratio is well balanced in all the other diet groups. Most cereal phosphates are present in an unassimilable condition in the form of inositol hexaphosphate. As the cereal consumption is not very high in the diets that have been surveyed, there is probably no risk of a concealed P-deficiency and consequent derangement of the Ca/P balance. The intake of iron appears to be adequate in all the diet groups but all the iron consumed may not be present in an ionizable and assimilable form.

TABLE IV

Group	PERCENTAGE CALORIC DISTRIBUTION IN THE DIET						VITAMIN CONTENT OF THE DIET						Per cent increase in weekly growth of rats
	Total	Protein	Fat	Carbo-hydrate	Milk and milk products	Cereal	Vit. A (I.U.)	Carotene (I. U.)	Carotene (μ . g.)	Vit. B ₁ (I.U.)	Vit. C (I.U.)	Vit. C (mg.)	
I	2,210	11.8	14.7	74.0	2.5	65.8	75	789	473.4	788	656	32.8	1.8
II	2,677	8.4	17.1	74.5	1.1	68.4	35	1,011	606.6	361	1,204	60.2	3.8
III	2,625	8.6	19.7	72.3	4.9	60.8	161	1,175	705.0	456	1,376	68.8	4.7
IV	2,726	10.3	15.6	74.0	4.2	68.9	124	819	491.4	462	950	47.5	4.4
V	2,592	14.1	18.4	67.5	5.7	75.9	93	1,433	859.8	1,413	1,148	57.4	5.5
VI	2,720	8.9	31.9	59.0	24.3	45.5	681	1,998	1,189.8	357	1,156	57.8	8.2
VII	2,499	11.4	28.7	59.8	14.6	48.1	706	1,730	1,038.0	431	1,024	51.2	11.0
VIII	3,183	9.1	40.9	52.5	31.4	30.2	572	3,160	1,896.0	728	2,580	104.0	13.8
IX	3,162	9.5	40.0	50.5	30.0	32.1	828	3,737	2,242.2	632	2,720	136.0	14.5
X	4,552	9.1	40.9	52.4	25.6	35.4	1,426	4,414	2,648.4	677	3,440	172.0	9.3
XI	4,117	7.5	44.9	47.5	30.3	25.4	751	3,376	2,025.6	823	3,680	184.0	4.5
XII	3,986	12.2	38.2	50.8	28.1	30.7	1,697	3,765	2,259.0	524	3,360	168.0	12.6
XIII	4,334	11.9	46.2	41.4	29.2	29.0	1,819	5,195	3,117.0	621	4,800	240.0	20.1

similar increase of fat intake with increase of income in certain families in Cardiff and Reading. The dietary rules for the use of fatty foods are quite simple, for most of the people are aware of the disadvantages of too fatty a meal. It is always desirable to take heavily-fatted foods in moderation. In the case of institutional diets the excessive fat consumption may, however, be more apparent than real, as it is sometimes difficult to obviate the possible chances of leakage of butter and ghee which constitute rather costly items of the diet.

Carbohydrate.—The carbohydrate intake in grammes per man value per day is given in table III. Carbohydrates being cheaper than proteins and fats, there is naturally a tendency, especially among the poorer classes, to increase the proportion of carbohydrates in the diet beyond the amount which is desirable. When a large proportion of the food is in the form of carbohydrate, the intake of fat or of protein is likely to be less than the nutritive needs of the

Calories.—Percentage calorie distribution in the diets is given in table IV. Although the actual protein intake in most cases is found to rise with the increase of income, the percentage of energy derived from protein sources is more or less identical in all the diet groups, and moreover this value is in most cases definitely below the accepted standards. The percentage of calories derived from fat is the highest with the largest income and lowest on the smallest income. With the increase of income there is a steady fall in the energy intake from carbohydrate sources. The calories derived from the milk and milk products are adequate in all the groups except in groups I to V and VII, in which they are low. The cereal calories are rather high in groups I to V. With rising income there is not only an increase in the total calories ingested but there is a more marked rise in the consumption of fat.

Vitamins.—The figures for the vitamin contents of the diet groups are given in table IV.

The values are taken from the *Health Bulletin* No. 23 (Aykroyd, 1937). The figures refer to the amount present in the edible portion of the uncooked food. For products that are cooked or otherwise treated proper allowance is to be made for the loss of vitamins. It is difficult at the present time to lay down authoritatively the minimal or optimal requirements of vitamins at different ages, but certain comparative statements can be made from the figures given in table IV. The diets of groups I to V are deficient in vitamin A and carotene, as compared to those of other groups. Vitamin B₁ appears to be adequate in all the groups. Vitamin-C content of the diets of groups I to VII is low in comparison to what is present in other diet groups.

Economic status in relation to diet

One of the most important tasks for people of small or moderate incomes is to know how to meet their nutritional needs at as low a cost as possible. Simple wholesome foodstuffs can be secured for a moderate expenditure, but it is just as true that good quality proteins in the form of milk, eggs, meat, and mineral and vitamin containing foods in the form of fruits require money. To buy expensively does not necessarily mean that one is getting the best in the physiological sense. The quality and quantity of food consumed are not therefore always dependent on income. It will be seen from table I that the percentage of income spent on food steadily diminishes with increase of income. With increase in the purchasing power only a part of the extra income is utilized in remedying the dietary deficiency; the greater portion is apparently spent towards improving the other items in the standard of living. Moreover, the extra money is not utilized to the best advantage, as is clearly seen in the ill-balanced diet of the masses where a liberal allowance is available for the purchase of proper materials in suitable amounts and proportions.

Rat growth tests

The weekly increase in the rate of the growth of rats fed on average samples of the different diets is shown in table IV. The average weekly rate of growth of albino rats on an adequate and well-balanced diet has been found to be 25 per cent of the body-weight.

Assessment of the state of nutrition

In the absence of adequate standards of height and weight for the various classes of the Indian community it is extremely difficult to make a correct assessment of the state of nutrition. A comparison of weight averages of groups of men with corresponding averages of European or American standards, might give some idea of the relative state of nutrition of the groups. In our measurements the weight of an individual of a particular age and height has been taken and compared with the weight of an American of the same age and height and the

percentage deviation of weight above or below the standard has been calculated. The results have been combined and the percentage deviation above or below the standards for all the persons in the groups obtained, the data for men, women, and children being treated separately. For each person the Pelidisi, hæmoglobin percentage, blood pressure (systolic and diastolic), vital capacity, and dynamometer grips have also been taken and the averages for the group worked out; these results are given in table V. The percentage incidence of deficiency and other diseases is shown in table VI.

Conclusions

(1) The average diet of the lowest income groups (I to V) is adequate in calories, deficient in the percentage of milk and milk product calories, rich in cereal calories. The diet is poor in total and animal proteins and also in vitamin A, carotene, and vitamin C owing to a deficiency of protective foods.

(2) The diet of the next income groups (VI and VII) is adequate in energy value, but poor in total and animal proteins.

(3) That of the third groups (VIII to XIII) is ill-balanced, having a high energy value and a high fat content.

(4) The increase in the intake of total calories and fat calories with a rise of income is very well marked, whereas the protein calorie consumption is more or less the same at all income levels.

(5) The physical condition of the subjects as far as it can be judged from the body-weight, Pelidisi and hæmoglobin percentage shows an improvement with increase of income.

(6) The results of the feeding experiments clearly show that most of the diets are incapable of ensuring adequate growth in albino rats.

(7) The survey reveals that the defective diet is not solely the outcome of a lack of means and the majority of people investigated irrespective of their income are living on an inadequate or ill-balanced diet.

(8) So far as can be judged from the physical and clinical survey of the small number of subjects investigated there is some evidence of under-nutrition, although there are no clearly manifest signs of deficiency and other diseases.

Acknowledgments

The authors are indebted to Dr. Jivraj N. Mehta for interesting himself in this investigation, for securing the funds needed for the enquiry and for his encouragement which he has given freely. Their best thanks are due to Mr. R. G. Chitre for rendering valuable technical assistance in the initial stages of the enquiry, to Drs. Miss P. Daruwalla, Miss J. Hakim, Miss Patankar, J. Mordecai, A. K. Boman Behram and P. L. Pawar for carrying out the medical inspection, and to the households and institutions that tolerated the visits of the workers and co-operated in the conduct of the survey.

TABLE V
Physical survey

Group	Sex	Number of subjects examined	AVERAGE AGE		Average per cent deviation of weight from American standards	Pelidisi	Hæmoglobin, per cent	BLOOD PRESSURE mm. or MERCURY		Vital capacity, c.cm.	Dynamometer readings
			Years	Months				Systolic	Diastolic		
I to V	Men ..	78	30	5	- 24.4	92	83.2	117	72	2,504	34
	Women ..	31	29	11	- 22.7	93	72.5	107	65	1,348	15
	Boys ..	23	7	10	- 19.0	91	73.0	93	56	1,157	13
	Girls ..	22	9	11	- 25.2	95	71.2	97	58	1,121	11
	Children ..	17	(6 months to 3 years.)		..	..	..	..	..	..	..
VI and VII.	Men ..	13	37	6	- 22.0	95	83.3	116	72	2,719	32
	Women ..	10	31	7	- 7.5	99	76.3	122	76	1,840	22
	Boys ..	6	7	2	- 2.1	93	70.3	90	42	866	9
	Girls ..	13	9	1	- 6.5	91	72.1	99	63	1,241	13
	Children ..	4	(6 months to 3 years.)		..	..	..	..	..	..	..
IX	Men ..	14	21	10	- 17.2	91	91.3	113	65	2,671	32
X	Women ..	14	25	6	- 13.1	98	90.9	105	65	1,703	16
XI	Men ..	20	22	6	- 16.4	95	91.3	114	66	3,005	34
XII	Women ..	78	23	2	- 13.2	97	85.2	110	67	1,718	17
XIII	Men ..	23	27	0	- 10.1	97	92.2	113	64	2,508	31

TABLE VI
Clinical survey—percentage incidence of deficiency and other diseases

Group	Sex	Enlarged tonsils	Adenoids	Carious teeth	Diseased gums	Enlarged glands	Skeletal deformity	Rickets	Bitot's spots	Phrynoderma	Angular stomatitis	Ill-nourished
I to V	Men ..	27.0	Nil	32.5	70.5	Nil	Nil	Nil	Nil	Nil	Nil	13.2
	Women ..	19.4	"	48.4	29.0	"	"	"	"	"	"	12.8
	Boys ..	56.5	"	74.0	21.7	"	8.7	8.7	"	"	"	17.2
	Girls ..	27.3	"	36.4	18.2	"	4.5	9.0	"	"	"	4.5
	Children ..	Nil	"	5.9	Nil	"	Nil	17.3	"	"	"	Nil
VI and VII.	Men ..	Nil	Nil	15.4	15.4	Nil	Nil	Nil	Nil	Nil	Nil	7.7
	Women ..	"	"	10.0	Nil	"	"	"	"	"	"	Nil
	Boys ..	"	"	Nil	"	"	"	"	"	"	"	"
	Girls ..	7.7	"	"	"	"	"	"	"	"	"	"
	Children ..	7.7	"	"	"	"	"	"	"	"	"	"
IX	Men ..	14.3	Nil	14.3	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
X	Women ..	7.1	"	21.3	"	"	"	"	"	"	"	"
XI	Men ..	15.0	"	Nil	"	"	"	"	"	"	"	"
XII	Women ..	5.1	"	7.7	"	"	"	"	"	"	"	"
XIII	Men ..	Nil	"	Nil	"	"	"	"	"	"	"	"

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THE SEROLOGICAL TYPES OF VIBRIOS ISOLATED FROM CHOLERA PATIENTS IN CALCUTTA

By C. L. PASRICHA

MAJOR, I.M.S.

M. N. LAHIRI

P. C. DAS

and

B. M. PAUL

(From the Cholera Bacteriological Enquiry, Indian Research Fund Association, School of Tropical Medicine, Calcutta)

VENKATRAMAN and Pandit (1938) have recently reviewed the literature bearing on the serological types of *Vibrio cholerae* and the few observations on the types of vibrios in relation to different epidemics. These workers record a severe epidemic of cholera in Periyakulum range of the Madura district in South India. They examined stools from 131 cases of cholera and studied 84 strains of vibrios isolated from 97 cases. These 84 strains of vibrios were all of the Ogawa type.

Maitra, Sen Gupta and Thant (1938) examined 52 agglutinable strains of *V. cholerae* isolated in Rangoon, and found that 51 of these strains were of the Inaba type and only 1 strain of the Ogawa type.

During the year ending 28th February, 1939, the stools from 959 clinical cases of cholera were examined. Vibrios were isolated from 438 or 45.7 per cent of the patients examined. Biochemically all the O-agglutinable strains were

arabinose-negative and belonged to Heiberg's groups I and II. The serological type was determined by agglutination test with rabbit sera prepared with Bruce-White's standard dried Inaba and Ogawa 'O' antigens and with a living suspension of *V. cholerae* (Inaba). The results are given in table I.

The Inaba O and Ogawa O sera used were completely differential and the agglutination with these sera was to titre. The titre of the different sera with their homologous strains were, Inaba 'O' —2,500, Ogawa 'O' —1,000 and Inaba 'H & O' —2,500.

The Inaba type of *V. cholerae* was isolated from 60.7 per cent of the bacteriologically-positive cholera cases. The Ogawa type was found in 25.8 per cent of such cases. The Ogawa type of *V. cholerae* was present throughout the year, and there was no appreciable preponderance of the Ogawa type at any particular time of the year or the cholera epidemic.

The H-agglutinable vibrios, i.e., vibrios inagglutinable with Inaba O or Ogawa O sera but agglutinable with Inaba H & O serum, were found in 2.8 per cent of the patients from whom vibrios were recovered. The inagglutinable vibrios were found in 10.7 per cent of the cases.

Summary

The types of vibrios isolated from the stools of 959 patients suffering clinically from cholera have been studied. The Inaba type was found in 60.7 per cent of the cases, the Ogawa type in 25.8 per cent, H-agglutinable vibrios in 2.8

TABLE I

The serological types of vibrios isolated from cholera patients in Calcutta during one year ending 28th February, 1939

Year	Month	Number of cases examined	Bacteriologically-positive cases	SEROLOGICAL TYPES			
				Inaba	Ogawa	Hagg ¹	Nagg ²
1938	..	March	162	78	12	..	12
1938	..	April	135	61	22	1	6
1938	..	May	126	54	26	1	6
1938	..	June	122	38	3	..	7
1938	..	July	63	6	2	1	1
1938	..	August	40	2	2	2	1
1938	..	September	34	4	..	2	..
1938	..	October	40	..	..	1	..
1938	..	November	82	12	12	..	2
1938	..	December	37	4	5	1	2
1939	..	January	36	4	4	..	3
1939	..	February	82	3	25	3	7
Total	..	959	438	266	113	12	47
Percentage	45.7	60.7	25.8	2.8	10.7

1 = Hagg or 'H' agglutinable. Inagglutinable with Inaba O or Ogawa O sera, but agglutinable with Inaba H & O serum.

2 = Nagg — Not agglutinable with any of the three sera.

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BACTERIOPHAGE IN AN EXPERIMENTAL INFECTION IN MICE

By C. L. PASRICHA

MAJOR, I.M.S.

Professor of Bacteriology and Pathology

and

S. LAL, M.B., B.S.

Research Worker, Indian Research Fund Association

(From the Department of Bacteriology and Pathology,
School of Tropical Medicine, Calcutta)

It has been claimed by several workers that bacteriophage exerts an important influence on the epidemic spread of infection. Greenwood, Hill, Topley and Wilson (1936) examined several reports of the use of bacteriophage in the ward, in the field, and in animal experiments carried out in the laboratory. Their critical survey does not support the many favourable reports that have been made or the reasons advanced from time to time for the failure of bacteriophage therapy or prophylaxis. They state that so far as their experience is concerned the dream of bacteriophage as the ideal agent for the control of epidemic disease still remains a dream. These workers however do not think that this field has yet been explored to the point at which further research becomes useless, and advocate the use of controlled animal experiments rather than the relatively uncontrolled trials in the field. The present paper deals with experiments carried out in 1936 and are recorded because the results show that bacteriophage produced a definite delay in mortality.

The experiment was carried out in mice and the organism used was a strain of *Bacterium paratyphosum B* the virulence of which had been enhanced by repeated passages through mice. The bacteriophage used was a mixture of different races of bacteriophage and produced a rapid and complete lysis of the test organism. At the beginning of the test each mouse received 1 c.cm. of a young broth culture containing 6,000 million organisms per c.cm. This was given conveniently with a 2-inch needle attached to a syringe. The end of the needle had been made blunt and thickened into a bulbous tip. The animals were then divided into two groups—one group received bacteriophage, 1 c.cm. of which was given soon after the culture, a second and a third dose of 1 c.cm. bacteriophage was given at two-hourly intervals. Thereafter, one dose

of bacteriophage (1 c.cm.) was given daily as long as the animal was alive. The control series received broth (in doses of 1 c.cm.) instead of bacteriophage used in the test series. The selection of the animals into the two series was left to chance. The animals were given the culture and then divided into two groups.

The experiment was carried out with a small convenient number of animals. For the sake of brevity, the results of the different experiments have been consolidated. The results of the individual experiments were almost identical. Sixty-eight mice were used in the test series and a similar number in the control series.

Days after the administration of the culture that the animals died	Number of deaths amongst 68 mice. Each mouse received $6,000 \times 10^6$ <i>Bact. paratyphosum B</i> by mouth	Number of deaths in the test series of 68 mice. Each mouse received $6,000 \times 10^6$ <i>Bact. paratyphosum B</i> by mouth followed by bacteriophage
1	11	3
2	10	5
3	0	3
4	0	1
5	0	4
6	4	8
7	5	12
8	6	7
9	13	9
10	8	6
11	3	1
12	4	2
13	1	3
Died later	3	4

Post-mortem examination and blood culture was made in each animal. The test organism was readily recovered from the blood of all animals after death except in a few animals that died during the night and were putrefied.

The results of this experiment show no difference in the eventual mortality in the two series but they do show a definite delay in the mortality. There are 21 deaths in two days amongst 68 mice in the control series whereas there are only 8 deaths in the bacteriophage series in the same period. This difference is of statistical significance. After the first two days there were no deaths in the control series for three days but deaths continued to occur in the bacteriophage series. Later on, there is no real difference in the mortality in the two series. No satisfactory explanation can at present be advanced for the high mortality in the control series in the first two days after oral administration of *Bact. paratyphosum B* and no deaths in the following three days. This was repeated six times with similar results. A few deaths continued to occur in the phage-treated series.

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per cent and inagglutinable vibrios in 10.7 per cent of the cases.

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THE INCIDENCE OF MONILIAS IN HUMAN FÆCES

By C. L. PASRICHA

MAJOR, I.M.S.

Professor of Bacteriology and Pathology
and

S. LAL, M.B., B.S.

Research Worker, Indian Research Fund Association
(From the Department of Bacteriology and Pathology,
School of Tropical Medicine, Calcutta)

ASHFORD (1917) and a number of subsequent workers regarded monilias, particularly *Monilia psilosis*, as the cause of sprue. Several species of the genus *Monilia* have been implicated in the causation of sprue and this disease was at one time regarded as moniliasis of the digestive tract. Although the result of recent work has shown that this view is no longer justifiable, there is a tendency for some authors of books on tropical diseases to ascribe a certain rôle, often secondary, to these fungi in the causation of sprue. Mackie and Chitre (1928) in Bombay examined the stools of 71 sprue cases and of 76 individuals who were not suffering from sprue for the presence of monilia. These workers found monilia as frequently in other intestinal diseases and in healthy men as in sprue, and concluded that there was no evidence to show that any of the yeasts studied by them had any causative relation to sprue. It was thought desirable to repeat this work in Calcutta.

Stools from healthy individuals and from individuals suffering from diseases other than sprue were examined for the presence of monilia. The methods employed were similar to those used by Mackie and Chitre and consisted in the isolation of the yeast on Sabouraud's medium. An attempt was made to classify into different species, the monilias isolated, but the results obtained after a study of 40 strains were so confusing that it was thought that no useful purpose would be served by proceeding with the

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Summary

The mortality in mice after the oral administration of *Bact. paratyphosum B* is given. The mortality in another series that received bacteriophage following the oral administration of *Bact. paratyphosum B* is compared.

Although there was no difference in the final mortality in the series that received bacteriophage there was a definite delay in mortality in the animals that were given bacteriophage.

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Med. Res. Council, Special Rep.
Ser., No. 209, p. 179. His Majesty's Stationery Office,
London.

identification of the individual species. The results of this examination are given below :—

Total number of individuals examined = 220
Number of individuals from whom various species of monilia were isolated = 144 or 65 per cent

(A) According to race and diet.

(1) Number of Indians on Indian diet examined = 146
Number from whom monilia were isolated = 106 or 73 per cent

(2) Number of Europeans on European diet = 76
Number from whom monilia were isolated = 39 or 51.3 per cent

(B) According to state of health.

(1) Number suffering from intestinal diseases (but not sprue) = 60
Number from whom monilia were isolated = 45 or 75 per cent

(2) Number not suffering from any apparent intestinal disease = 160
Number from whom monilia were isolated = 99 or 62 per cent

The number of monilia colonies present in each plate were counted. Twenty or less colonies were considered as scanty isolation, more than twenty colonies as abundant. The results obtained in healthy individuals, in those suffering from acute intestinal fluxes and in those suffering from chronic or vague intestinal disturbances are summarized in table I.

TABLE I

Showing the number of colonies isolated from the stools of individuals suffering from acute and chronic intestinal disturbances and from apparently healthy individuals

Clinical	Number of individuals in whom monilias were found	PER CENT CASES IN WHICH MONILIAS WERE ISOLATED	
		Scanty, 20 or less colonies	Abundant, more than 20 colonies
Healthy individuals. No intestinal disturbances.	99	37	63
Acute intestinal fluxes.	9	33	67
Chronic intestinal disturbances.	51	34	63

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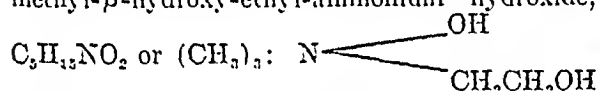
IMPORTANCE OF CHEMICAL TESTS FOR DETECTION OF SEMINAL STAINS IN MEDICO-LEGAL INVESTIGATIONS

By RAJ BAHADUR K. N. BAGCHI, B.Sc., M.B. (Cal.),
B.T.M. (Cal. & Liverpool), F.I.C.

Chemical Examiner to the Government of Bengal,
Calcutta

THE medico-legal work carried out by the chemical examiners in India involves examination of large numbers of garments and other articles for the detection of seminal stains. As these cases appear to be steadily increasing in almost all the provinces, a quicker method of examination is very much in demand to-day. The chemical tests for semen are known to give satisfactory results, but there is such a sharp difference of opinion about the significance of these tests that nobody feels inclined to utilize them for purposes of giving a definite verdict in such cases.

The chemical tests for detection of semen depend on the fact that a base, choline, which is found free in seminal fluid, combines with various alkaloidal reagents to form characteristic micro-crystalline compounds. Chemically, choline is trimethyl- β -hydroxy-ethyl-ammonium hydroxide,



that is, ammonium hydroxide in which one hydrogen atom is replaced by the oxyethyl group ($\text{CH}_2\text{CH}_2\text{OH}$) and the other three by methyl groups. It is present in all living cells usually in the form of lecithin which is a compound of choline with glycerophosphoric and fatty acids. The seminal fluid contains as much as 0.514 per cent of choline, mostly as a free base, while brain contains 0.325 per cent (Fletcher *et al.*, 1935) which does not occur, even partially, in the free state (Barger, 1914). In healthy blood it is only 0.031 per cent and that also in the form of lecithin (*loc. cit.*).

Lecithin is present in healthy prostatic secretion in the form of small refractile granules which are known by the name of lecithin bodies.

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These results (which are based mostly on one stool examination from each individual) confirm the conclusions arrived at by Mackie and Chitre. The yeast-like fungi are present in such large numbers of healthy individuals that no significance can be attached to their presence in any particular infection without additional evidence.

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As prostatic secretion forms an important component of seminal fluid, in the normal course semen contains choline as a free base as well as a compound in the form of lecithin. The amount of lecithin in the prostatic secretion depends on the healthy condition of the prostate—any inflammatory process, whatever be its cause, tends to diminish or stop the secretion of lecithin bodies (Pelouze, 1928). In a person suffering from prostatic troubles, acute or chronic, his semen may be deficient in or free from them. Lipase and certain other ferments act upon lecithin and convert it into choline, glycerophosphoric acid, etc. (Maclean and Maclean, 1927). It is not known if any such ferments are present in the testicular secretion and are responsible for such a large amount of free choline in semen.

Choline and other natural bases are precipitated by alkaloidal reagents, e.g., mercuric chloride, iodine in potassium-iodide solution, platinic chloride, picric acid, phosphotungstic acid, Dragendorff's reagent, tannin, etc. (Barger, 1914). The fact that iodine in potassium-iodide solution precipitates the natural bases completely as periodides forms the basis of the test of Florence who first utilized this property in 1897 for detection of semen, and the choline periodide crystals were described as spermine iodide. Bocarius (1901) first proved that the crystals were of choline periodide. The most delicate precipitants are Stanek's concentrated potassium tri-iodide solution (153 grammes of iodine and 100 grammes of potassium iodide in 200 grammes of water) and solution of mercuric chloride or platinic chloride in absolute alcohol.

The precipitation of choline as a micro-crystalline choline picrate by saturated picric acid solution (alcoholic or aqueous) forms the basis of Barberios' test for semen.

Both the chemical, rather the micro-chemical, tests—Barberios' and Florence's—have been successfully employed in medico-legal work. Barberios' test has not been popular on account of an amorphous precipitate being produced at the same time by picric acid on albuminous substances and of the pleomorphism of the crystals. A preliminary treatment of the stain with 2.5 per cent trichloroacetic acid as introduced by Harrison (1932) has affected the sensitiveness of the test. It takes a much longer time and sometimes fails to develop the crystals in old stains and in stains with scanty material. The facts that picric acid forms crystalline and amorphous compounds with a large number of substances and that the garments received for examination in these cases are likely to contain food-particles, faecal matter and various other extraneous substances render difficult, if not impossible, the identification of various forms of choline picrate crystals (spermine picrate as it was originally called) from other crystalline compounds which may be produced by picric acid with the unknown substances. The following forms of choline picrate crystals are

generally found under the microscope—(1) Lenticular forms looking like Charcot-Leyden crystals, (2) needle-shaped crystals appearing either singly or as crosses and star-shaped, (3) crystals with irregular outline—some of them being H-shaped, and (4) crystals with a feathery appearance.

Florence's test is, on the other hand, quite popular with the medical jurists all over the world. The choline periodide crystals (the probable formula being $C_6H_{14}ONLI_6$ or hexaiodide) are all monoclinic prisms or rhombic plates of a dark-brown colour. They appear mostly as single crystals and some as crosses or in clusters. Sometimes a few fine needle-shaped crystals are also formed along with the prisms. The shape, size and colour of these crystals are so very characteristic that they cannot possibly be mistaken for anything else but the hæmin crystals obtained from hæmoglobin by an altogether different method and with different reagents. This test is undoubtedly a valuable one but there is no unanimity among the workers about its actual value. Some consider that it is a valuable negative test (Taylor, 1934; Thomas, 1937), some are of opinion that it is a useful preliminary test (Smith, 1938; Gonzales, Vance and Helpert, 1937), and there are others who do not seem to take any notice of it and are guided entirely by the presence or absence of spermatozoa. On the other hand there are a few workers who base their opinion mainly on this test.

While examining in this laboratory several thousands of specimens extending over a number of years, it has been observed that in a fairly large number of cases giving negative Florence test, entire spermatozoa are found in the stains (Bagchi, 1937). In an old specimen of a seminal stain, carefully preserved for over six years in this department, spermatozoa are detected quite easily even now but the Florence is always negative. In fresh stains on clothes, if not carefully dried or if mixed with blood or pus, no positive result by the Florence's test is obtained even after 24 hours, while the spermatozoa are detected without any difficulty (Chakraverti and Roy, 1938). These facts prove conclusively that choline of semen is rapidly decomposed, possibly by bacteria, especially in the presence of albuminous substances like blood and pus, into substances which do not give the characteristic micro-crystalline precipitate of periodide, while the spermatozoa being comparatively more resistant escape the action of bacteria and are detected under the microscope. A negative Florence has therefore no medico-legal value. It only proves the absence of choline either as a free base or as a salt, and does not prove the absence of semen in the stain. It indicates on the other hand the necessity for a careful search for spermatozoa under the microscope in a few well-stained slides, before a definite negative verdict is pronounced. It may also be noted

that choline, if esterified, does not give a positive reaction (Booth, 1935).

How choline disappears from the stain is not properly understood. It has been found that certain bacteria present in hay-infusion convert choline into another base known as neurine ($C_6H_{13}NO$) while *Bact. prodigiosum* decomposes it completely into trimethylamine (Barger, 1914). The organisms of the proteus group are also believed to produce disintegration of the natural bases along with the protein constituents. An investigation as to the stability of choline in seminal fluid is in progress.

The next point for consideration is the value of a positive Florence reaction. Most of the workers in this line hesitate to give a definite opinion on the basis of a positive test, and consider it as a presumptive test to be confirmed by microscopic examination of the specimen. The hesitation or the disinclination to take the positive result as the final test originates from the belief that choline is present in almost all animal and vegetable tissues, and therefore a positive result may be given by these extraneous substances if they happen to be present in the articles under examination. Since choline is a constituent of lecithin it may be found in blood and other tissues, but there is no possibility of its presence as free choline and in sufficient quantity to be detected by the Florence reagent. Semen is the only biological material in which choline is found free in large quantity, and this is the reason why a minute trace of semen sticking to hair or fine cotton fibres gives well-marked crystals under the microscope. The animal or vegetable tissues containing combined choline require tediously long processes for liberation and extraction of this base in sufficient amount for detection by any of the delicate reagents stated above. Even pure lecithin which is rich in choline does not give a positive reaction with the Florence or any other delicate reagent, but if hydrolysed by boiling with saturated baryta solution or 40 per cent sulphuric acid (Barger, 1914) it splits off choline and gives a positive result. If a suspension of pure lecithin (egg lecithin of Schering-Kahlbaum) in water is kept overnight at room temperature slight spontaneous hydrolysis takes place and choline is liberated, but the yolk of egg under the same condition does not undergo any hydrolysis. It is true that bacterial action, specially during putrefaction, liberates choline from lecithin of the tissues, but the amount obtainable from a small quantity of any of the tissues, except perhaps brain and spinal cord which cannot possibly by any stretch of imagination be connected with a suspected seminal stain in a garment, is negligible for purposes of the Florence test. Besides, the action of putrefying bacteria does not end in simply liberating choline, but proceeds further until the base itself and other products of putrefaction are decomposed into monoethylamine, triethylamine and

other simpler compounds, and finally into CO_2 , NH_3 , CH_4 , etc.

To demonstrate the possibility, or otherwise, of actual liberation of free choline or any other base of that type in various substances, which may be present as contaminations in garments received for medico-legal examination, the following materials were examined:—Blood from finger tip; heart blood; menstrual blood; leucorrhoeal discharge of adult females and young girls of both specific and non-specific origin; normal vaginal secretion; pus from suppurated Bartholin's gland; pus from boils and gonorrhoeal urethritis of men and women; nasal discharges; sputum; human faeces; cow dung; starch solution; white and yolk of eggs and fruit juices. In fact all sorts of materials which might be found on the clothes of men or women involved in cases of sexual offences were examined and not a single one of them gave even a doubtful positive reaction. To imitate, as far as possible, the actual condition of ordinary seminal stains, the materials were applied to clean linen and also to pieces of cloth snipped off from dirty garments received in connection with rape cases. The artificial stains, thus produced, were examined exactly in the same way as the actual stains are examined in our routine work. In addition to those, ox bile and some brain tissues from man and sheep were also submitted to the same method of examination to see if these substances, rich in choline, could give a positive reaction, but the result was the same throughout. Some of these stains were tested every alternate day for about two weeks, but the bacteria present in air, water or the dirty clothes on which the stains were prepared did not produce any effect on the choline-containing substances.

The results of these experiments should impress upon the workers in this line the necessity of revising the existing notions about this test. There is absolutely no possibility of a positive reaction from sources other than the seminal fluid and consequently there should not be any hesitation on the part of the medical jurists to pronounce a positive verdict on the basis of a positive Florence test, which obviously admits of no fallacies to vitiate the result.

Another important observation, which may lend additional weight to the conclusion already arrived at, may now be considered. Under certain conditions, the semen of healthy persons shows no spermatozoa at all (aspermia) or at most a few spermatozoa (oligospermia) under the microscope. These cases are not so rare as we usually believe. Lately, an investigation has been taken up by the medical officers in charge of the Hospital for Women, Leeds, to determine the causes of infertility of men (Currie and Lissimore, 1939). Out of 166 samples of semen obtained from sexually potent husbands, they found 18 per cent to be aspermic and 38 per cent oligospermic. In this country no such investigation is yet possible, but I believe the possibility

of finding such cases among men who are involved in sexual offences is not so remote as to dismiss the question without going through it carefully. I had occasion to examine fresh specimens of semen of about half a dozen aspermia cases and in every case, except one who had other abnormalities as well and gave a doubtful reaction, the Florence test was strongly positive. If the presence of spermatozoa is considered as the only criterion for giving a positive diagnosis, the examiner is obviously on the wrong tack and his opinion will be extremely fallacious if he ignores in such a case the positive Florence test and depends on the result of search for spermatozoa. A positive Florence test may therefore be safely taken as an indication of the presence of seminal fluid.

Summary

Seminal fluid is the only biological material which contains a very large amount of free choline which gives the characteristic choline periodide reaction known as the Florence test. Choline when not free, for instance in lecithin, does not produce the reaction.

A negative Florence test has no medico-legal value; known seminal stains, under certain conditions, give a negative Florence reaction while entire spermatozoa are easily found under the microscope.

A positive Florence test is important and indicates the presence of semen. Various animal and vegetable matters which are likely to be present, as dirt or contaminations, in the garments of men or women involved in sexual offences, were examined for choline by the periodide test, but the results were negative in every case. There is no possibility of a false positive.

Cases of aspermia are not rare—the seminal fluid of these men gives a strongly positive Florence reaction, although it does not contain any spermatozoa. As these men are sexually potent, the presence of spermatozoa should not be the only criterion for giving a positive diagnosis. A positive Florence test therefore may be taken as an indication of the presence of semen.

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A Mirror of Hospital Practice

URTICARIA FOLLOWING LIVER EXTRACT

By RAMANIK H. DESAI, L.C.P.S. (Bom.), L.T.M. (Cal.)
Honorary Medical Superintendent, S. M. Maternity Home, Santh Pipli, Nadiad

A FEMALE patient, aged 27 years, was given an injection of Campolon 2 c.cm. Immediately afterwards there was irritation near the site of injection, and a few weals appeared. She was also restless.

Next time she was injected with another brand of liver extract and the result was the same. 'Exatrope' was used on the third occasion, and she had a very severe reaction. Weals appeared after a few minutes all over the body, accompanied by irritation and restlessness. On the fourth occasion 5 c.cm. of Campolon preceded by a dose of ephedrin $\frac{1}{2}$ gr. was given and the reaction was less severe.

The woman was very anæmic. The red corpuscles were below 1 million per c.mm.; her leucocyte count was normal. Hæmoglobin was 65 per cent.

Previous history.—She was delivered of a female child on 11th January, 1939, and she developed *B. coli* infection on the 13th day of the puerperium. Also she had diarrhoea, colic and sore mouth. Stools showed only cellular exudate and the urine was normal. She had an irregular temperature varying between 102 and 104°F. Her pulse was 130.

I persisted with Campolon injections because I considered liver extract given orally would not have been of much use on account of her gastro-intestinal condition, and she improved very much.

Can liver extract be given intravenously and with safety in such cases?

[Note.—The answer is that it is not safe to give ordinary liver extract intravenously in any case and much less to an obviously sensitive patient.

For intravenous administration special protein-free liver extracts are prepared. It might be safe to give one of these in such a case.—EDITOR, I. M. G.]

M. & B. 693 IN PNEUMONIA

By W. J. MODY, M.A., M.B., F.R.C.S. (Edin.)

CAPTAIN, I.M.S.

British Legation, Kabul

PNEUMONIA is a much dreaded disease among the European and Indian communities of Afghanistan on account of the extreme severity of the winter. For three or four months the daily minimum temperature in Kabul falls to between 20 to 30 degrees below freezing point. Generally in the winter a few cases of pneumonia occur among the legation staff.

Although our incidence is trifling and the results correspondingly insignificant in comparison with world statistics, it may be of interest to quote our experience as adding a 'widow's mite' to the weight of evidence in favour of M. & B. 693.

In the winter of 1937-38 there were two cases of pneumonia both of which proved fatal. During the past winter (1938-39), there were three cases with no deaths. The first of these was treated non-specifically, and recovered following a crisis on the fifth day. The other two (described below) were treated with M. & B. 693, and the results were as dramatic as they were satisfactory.

Case 1.—A. H., a cook, aged 45 years, was admitted on 1st February, 1939, having become ill the previous day with fever, cough, and pain in the left chest. He stated that he had suffered from chronic bronchitis and a 'bad heart' for over two years. His temperature was 101.6°F., his pulse 118, irregular and respiration 38 per minute, there was a double murmur at the apex. There were scattered râles over both lungs, with crepitations and signs of commencing consolidation over the left base. He was given M. & B. 693, 2 tablets 4 hourly for 36 hours, followed by 1 tablet 4 hourly for 48 hours, and then 1 tablet t.d.s. for a further 48 hours. Within 24 hours of commencing treatment his temperature fell to 97.4°F. and remained subnormal until the 6th day when it rose to normal and remained so until his discharge on 8th February. During the last two days of administration of the drug he complained of slight abdominal discomfort and nausea; he never actually vomited.

Case 2.—M. Y., a car cleaner, aged 40 years, with two days' history and definite signs of consolidation over the left lower lobe. Temperature 101.5°F. Pulse 102. Respiration 33 per minute. He also was given M. & B. 693, dosage as for case 1, and with the same result. The temperature fell to subnormal within 24 hours, and remained so until his discharge from hospital. He displayed no untoward effects from the treatment.

Chand, Taylor and Chitkara point out that there are no obvious signs of resolution occurring 'in an abnormal way or at an earlier or later period than usual'. This is what one would expect as the drug merely arrests the infective process. Presumably repair of the damaged lung tissue is carried out by the body by its normal processes.

Dutta stresses the importance of 'good nursing'. With this, and all that the term implies, everyone will be in the fullest agreement, and furthermore I am sure that the need for it remains as essential as ever even though we have at our disposal such an effective drug as M. & B. 693.

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IRON METABOLISM

IRON is an essential element in mammalian dietary. A certain minimal amount is required by the cells of the tissues for maintaining normal metabolism, and, however much an animal is starved of iron, this small amount of iron is held by the tissues. The main needs of the body for iron are for the formation of hæmoglobin. Blood destruction and blood formation are continuous physiological processes and in an average-sized man obsolete red cells equivalent to about 200 c.cm. of blood are destroyed and replaced daily. The amount of iron required for this blood formation is considerable, but fortunately the body is capable of re-utilizing the iron from the destroyed corpuscles; further, the tissues of the body, particularly those of the liver, have a great capacity for storing iron, so that temporary deficiencies of iron are easily compensated.

In the processes of blood destruction and blood formation, there is a considerable wastage of iron and this wastage has to be made up. The wastage is met by iron in the food. The amount of iron required daily is variously estimated as 10 to 15 mgm. Most food substances contain iron, some in larger amounts than others, and in nearly all food tables the iron content of each substance is given, so that by tabulating the substances taken by an individual and looking up the iron content it should be an easy matter to calculate whether that individual is taking enough iron.

It is not, however, as simple as this. Iron taken in the food is not assimilated quantitatively. As is the case with medicinal iron, from some food substances a large percentage of the iron is absorbed and utilized, and from others little or none. This has been appreciated for some time, and a few years ago Hill devised a method for estimating the inorganic iron in food by means of dipyriddy. The method has since been elaborated, adopted as a means of testing the 'availability' of iron, and applied extensively; and in many books on dietary, tables showing the percentage 'availability' of the iron in different food substances are given. For example, there is such a table in the *Health Bulletin No. 23* (1st Edition), which shows that the percentage availability of iron varies from 19 in spinach to 90 in the tinned peas, being 47 per cent in wheat, and 70 per cent in beef (heart or liver).

Thus, we appeared to be progressing towards a more accurate appraisal of the iron value of food substances, though the discrepancies in the findings of different workers were causing some uneasiness; for example, in spinach, to which we

have already referred, the availability of the iron is given as 19, 25, and 68 per cent by different workers. Now, however, our hopes in this direction have been entirely shattered by the work of Whipple and others who have shown that there is little parallelism between the dipyriddy value and the true availability of iron tested by animal experiment. For practical purposes we are now where we were ten years ago. The biological test appears to be the only one that can be trusted and it will be many years before the figures for all common food substances will be available, especially as a further complication has been added by the fact that from any one substance the iron is not absorbed quantitatively, as it was shown in some experiments that the larger the amount given the less was the percentage absorbed.

Dr. Aykroyd, appreciating the present position, takes the view that in the present state of our knowledge the only safe procedure is to allow a good margin of safety and in the new edition of *Health Bulletin No. 23* he suggests that for a mixed diet 20 mgm. of iron a day should be sufficient to meet all normal physiological calls, and we note that he has omitted the iron-availability table. Dr. Aykroyd's and the Coonoor Nutritional Research Laboratories point of view are expressed in a recent paper (*I. J. M. R.*, 26, 119) by Dr. Ranganathan.

The ryot in India lives on a diet which is almost certainly very close to the iron-deficiency line. Rice is poor in iron, particularly when it is milled, so that 'on paper' most of his iron is derived from pulses, vegetables, fruits, or meat. The iron derived from vegetables is on the whole of low availability, whereas that from meat is on the whole high—it is not safe to be more precise than that—so that the ryot whose food consists mainly of rice and who takes no meat is probably living on a diet deficient in iron.

If to this state of affairs a blood loss is added, as for example in hookworm infection, he will certainly suffer from an iron-deficiency anaemia.

In an investigation on the anaemia in coolies in Assam, Napier (*I. M. G.*, 72, 270) and his co-workers found that in 39 out of 41 unselected anæmic coolies the anaemia was of the hypochromic microcytic type and that in every case there was a marked improvement in the blood picture when iron was given in large doses. All these coolies had a hookworm infection, but this varied in degree. It is only possible to conclude, firstly, that these patients were suffering from an iron-deficiency anaemia, and, secondly, either that the available iron they were receiving in their diet was insufficient for their particular requirements, or that for some reason they were not absorbing it; the latter alternative, though it was considered, was ruled out for various reasons including the fact that they absorbed it readily when it was given in medicinal form. Admittedly, in these coolies their requirements were not the normal physiological requirements of iron, but added to this was the requirement

for additional iron to replace the iron lost in the blood that was continuously being removed by hookworms.

Elsewhere in this number will be found a paper by Dr. Mitra who has carried out a dietary survey amongst the same population in which these cases of hypochromic microcytic anæmia were found. He has shown that whilst the average iron intake in two groups investigated was 18.77 and 27.79 mgm., respectively, the average of the 'available iron' was only 4.61 and 6.73 mgm.: further, of 72 families in which dietary surveys were done, in only one was the 'available iron' up to 12 mgm. which Dr. Mitra, accepting Sherman's standard, considers to be the minimum requirement. Thus, on the one hand, according to the *Health Bulletin* standard of 20 mgm., the two groups as a whole and the majority of the individual families appear to be receiving sufficient iron, but, on the other hand, when the availability of the iron is taken into consideration their diet is shown to be grossly deficient in this element. It is obvious that these opposing points of view cannot be composed until we have much more accurate data on the true availability of iron in different food-stuffs. Even if they were in agreement we

should still be no nearer the fact which we want to ascertain, namely, the *particular iron requirements* of this hookworm-infected population.

There are in the estimation of iron in food on the one hand and on the requirements of the individual on the other, so many variables, that chemical methods of estimating iron balance are of doubtful value, and one is inevitably thrown back on to the clinical, or biological, method; in our opinion far more importance should be attached to the demonstration, by the combined hæmatological and therapeutic methods, of iron deficiency in the population concerned than by any dietary survey. The blood picture of iron-deficiency anæmia, a microcytic hypochromic anæmia with a very low mean corpuscular hæmoglobin concentration, is characteristic and the typical response with a sharp reticulocyte crisis to the administration of ferrous iron in large doses puts the diagnosis beyond question.

When, however, the dietary survey points to the same fact, as in this case, this may be accepted as contributory evidence that the people are living on a low iron intake and are therefore in a low state of iron balance which is easily turned into a deficit by the extra drain of blood lost through a hookworm infection.

Special Articles

TROPICAL SPRUE

A RESUME OF A LECTURE

By L. EVERARD NAPIER, M.R.C.P. (Lond.)

Professor of Tropical Medicine, School of Tropical Medicine, Calcutta

Definition.—A diarrhoeal condition of uncertain ætiology characterized by the passage of large, light-coloured and frothy stools, usually in the morning, flatulent dyspepsia, and sore tongue, and in its final stages a marked macrocytic anæmia, occurring amongst people who live, or have lived, in certain tropical countries.

EPIDEMIOLOGY

Geographical distribution.—China, India, Ceylon, Malaya, East and West Indies, South U.S.A., Central and South America, South Italy, and Queensland; that is to say, it is mainly tropical, but a few subtropical areas are included and the disease is rare in tropical Africa.

Age and sex.—It shows a female predominance and is most common in middle age, but it may occur in young people and even in children.

Race.—Mainly Europeans, particularly domiciled Europeans, and Anglo-Indians, but typical sprue also occurs in Indians, and other indigenous inhabitants.

Climate.—It occurs in hot damp coastal climates. It is regional as well as climatic; that

is to say, sprue is often common in one and rare in another of two places that appear to be climatically identical. It often follows long or frequent hill residence and repeated attacks of hill diarrhoea.

Seasonal.—The onset is usually after or during the rains.

Other epidemiological observations.—Sprue houses have been reported and this has led to theories regarding its infectious nature; and some people have associated it with ants, and with dry rot. Husband and wife not infrequently both suffer from the disease.

Ætiology.—There are numerous theories regarding the ætiology of this disease:—

(a) *The infective theory.*—There are still a large number of writers who consider that the evidence is in favour of some infective organism being the cause of the disease; the points in favour of this are the tropical and regional distribution, the fact that husband and wife and sometimes whole families are infected, and that 'sprue houses' have been reported. The organisms under suspicion can be grouped as follows:—

(i) *Monilia*, especially *Monilia psilosis*, or *Parasaccharomyces ashfordi*. This theory was supported by Ashford, Manson-Bahr, and Kohlbrüge, but it is now generally considered that their presence is simply a matter of the suitability of the bowel contents in sprue as a

medium for these organisms. It has been shown that this and other monilias are present in the bowel under normal conditions, and that in any diarrhoeal condition they may become more abundant.

(ii) Streptococcal infections. Haemolytic streptococci are usually obtainable from the stool and mouth, but are probably secondary invaders.

(iii) Some specific organism as yet unidentified.

(b) *Calcium deficiency.*—The total calcium is below normal in about half the cases, but the more marked deviation from normal is the reduction in ionic calcium, which was at one time thought to be due to dysfunction of the parathyroids, possibly caused by excessive strain on its detoxicating functional activity; it is now thought that it is due to failure of absorption.

(c) *Simple failure of absorption due to degenerative and atrophic changes in the intestinal mucosa.*—Recent work has shown that there are no constant histological changes in the mucosa of the gut in sprue.

(d) *Food deficiency.*—Absence or deficiency of A and B vitamins, extrinsic factor deficiency, and deficiency of certain important amino-acids, have all been suggested.

(e) Finally, Fairley has suggested that it is a metabolic failure, a functional rather than a mechanical failure to absorb and to utilize both fats and carbohydrates.

All these theories can to a certain extent be correlated, and in the writer's opinion sprue is a metabolic breakdown, a failure to absorb and utilize fats, glucose, calcium, haemopoietin, and other essential substances, as a result of some infection, or a succession of debilitating infections (exhaustion of the parathyroid), unsuitable diet over a long period, including excess of carbohydrates and fat with deficiency of good protein, and an ill-distribution of blood supply in a hot and humid climate, in which the skin demands too much blood and the viscera are left in a relatively anæmic state.

Pathology.—Changes from mouth to ileo-cæcal valve have been described. Thinning and loss of papillæ of mucous membrane of the tongue which is easily damaged and therefore there are aphthous ulcers and general soreness, loss of submucous tissue and atrophy of the muscles. There are no constant changes in the mucous membrane in any part of the intestinal tract, but thinning of the mucous membrane, loss of submucous tissue, and wasting of muscular coats; any ulceration that occurs is incidental and on part of the general pathological picture.

The previous misconceptions regarding the pathology of sprue are thought to be due to post-mortem distension and rapid degenerative changes. This can be obviated by rapidly injecting formalin into the intestinal tract immediately the patient dies; if this is done no histological changes will be seen in the mucous membrane.

Heart.—Small, brown atrophy. *Liver and spleen*—small, loss of 20 to 30 per cent in weight—prussian blue reaction.

Kidneys.—These show similar changes.

Bone marrow.—There is a general megaloblastic hyperplasia, with a peculiar gelatinous appearance of the marrow, which is found in certain nutritional anæmias and is probably due to specific starvation. Suprarenal atrophy and degeneration in the pancreas are described.

Blood.—There is a decrease in fat—to 0.4 g. (normal=0.6 g.) per 100 c.c.m., and in the ionic calcium which is usually about 7 to 9 mg. Cholesterol is reduced to 70 mgm. (normal=150 to 200) and even down to 40 mgm. The glucose curve after ingestion tends to be flat, whereas after intravenous glucose it rises sharply, but does not fall as quickly as normal; general carbohydrate starvation has produced hypo-activity of endogenous-insulin.

The van den Bergh (indirect) is usually slightly above normal and the urobilin in the urine is increased.

There is usually a macrocytic anæmia with normoblasts but rarely megaloblasts in peripheral blood.

Gastric analysis.—Free acid is usually present but the acid curve is low. Mackie and Fairley found achlorhydria in 14 of 44 cases.

Stools.—The first stool in the morning is always bulky, pale and frothy; for the rest of the day the stools are pale and fluid, but occasionally normal in appearance. The white appearance is not due to absence of urobilinogen, but to its change to leucobilin by the action of intestinal bacteria.

Normally, the total fat is 10 to 25 per cent of the weight of the dry stool; of this two-thirds is split fat; this split fat is found in the stool as fatty acid or combined as soapy fat. One-third remains as neutral fat.

In sprue, in 80 per cent of cases the fat is over 25 per cent and it may be 60 per cent; two-thirds of this is split, but even more may be split, so that neutral fat to split fat may be 1 to 3 or even 5. The important point is that, though the pancreas is doing its work, the fat is not being absorbed and utilized.

SYMPTOMATOLOGY

The prelude to sprue.—Many patients give a history of an attack of dysentery which is followed by troublesome diarrhoea, for which they have received a variety of treatments with correspondingly varied results. Amongst these treatments is always included a long period of restricted dietary.

Onset.—This may be slow and mild, or mild but insidiously progressive, or rapid and severe. The patient has a sallow muddy complexion, and a parchment-like skin with patchy pigmentation on different parts of the body, e.g., the malar eminences, forehead, buttocks, etc., the nails are brittle and the patient is emaciated and anæmic. The anæmia may be very

prominent and many of the symptoms may be attributable to this. A low irregular fever is not uncommon.

Mouth.—The tongue has a characteristic appearance; at first it is red and sore, the mucous membrane is thickened and folded, then later it is red and smooth with loss of papillæ, and aphthous ulcers form on the frenum and edge of the tongue and in the mouth generally.

Abdomen.—There is the characteristic tumid lower segment, with the thin abdominal wall distended and drum-like in appearance; peristaltic movements are visible, there are borborygmi, and the liver dullness is diminished; this is due to an actual decrease and to the general distension of the intestines.

There is usually œdema of the legs, and loss of knee jerks.

Symptoms.—There is soreness of the mouth and dysphagia particularly for hot food or spices, indigestion and meteorism but seldom vomiting. There is morning diarrhœa, large frothy and bulky stools constantly, with occasional attacks of loose stools throughout the day, but the stools after the first may be formed, general lassitude and weakness, tetany, cramps, and muscular twitchings, and paræsthesias.

There is both mental and bodily irritability, and often neurasthenia.

The appetite is usually poor, but occasionally it is ravenous with disastrous results.

Radiological findings.—The bowel empties rapidly; the colon is reached in 3 hours, and the small intestine empties in 6 hours. The large intestine usually empties rapidly, but there may be obstinate stasis.

Progress.—The condition progresses steadily if rigorous treatment is not undertaken. With half-hearted treatment there may be periods of remission, but eventually symptoms will recur and the disease progress. Death is due to exhaustion and intercurrent disease.

Latency.—The condition may improve and remain latent for some time and then relapse after 1 or 2 years, but sometimes after a longer period.

Incomplete sprue.—Sometimes one particular set of symptoms predominates; gastric and mouth symptoms may be encountered without any diarrhœa, or there may be lower-bowel symptoms without the sore tongue.

Diagnosis.—This mainly depends on clinical observation, but it can be confirmed by chemical examination of the stools and, later, by the development of macrocytic anæmia in the presence of normal or low gastric acidity.

DIFFERENTIAL DIAGNOSIS

Celiac disease.—This is a disease of calcium metabolic dysfunction, not uncommon in children who have been born in the tropics, but it is usually considered to be a congenital deficiency. A similar disease in adults occurring in temperate climates is very like sprue.

Pancreatitis.—Pancreatic dysfunction, due to pancreatitis or new growth, is distinguished by the high percentage of neutral fat in the stools.

Pellagra.—The tongue condition is suggestive of pellagra but the characteristic fatty stools are not found in this disease: the epidemiologies of the two diseases are very distinct.

Other conditions with which it might be confused are *dysentery* and *chronic diarrhœa*, *lambliasis* on account of the fatty stools, and *tropical macrocytic anæmia*. There is some reason to believe that the nutritional macrocytic anæmia that occurs in some countries has been described as sprue.

TREATMENT

There is no short cut to treatment of this condition. The patient must be warned that his whole-hearted co-operation is essential and that he must be prepared to face a period of at least two months of hospital, or the equivalent, treatment.

The treatment consists of rest in bed, a strict dietary régime, and treatment for the anæmia; otherwise it is symptomatic. In cases of macrocytic anæmia parenteral liver extract, hepatex, anahæmin, pernæmon or other well-known preparations, should be given in full doses. This will often produce an immediate improvement in the blood picture. In view of the fact that many patients have been living on a restricted diet, iron should also be given. Even in the cases in which anæmia is most prominent this treatment alone is not sufficient and a dietary régime will be necessary. The reported cases in which liver treatment alone was effective were probably not true sprue, but nutritional macrocytic anæmia.

Diet.—Milk is usually the most suitable diet for Indians. At first milk from which the excess of cream has been removed by skimming, not by mechanical separation, should be given. Commence with 2 pints and increase the amount gradually up to 5 pints or even more daily; give 2-hourly in 4 to 10 oz. feeds; the patient should sip the milk or take it with a spoon. Some patients may have to have butter-milk or peptonized milk at first. Benger's or Horlick's food can be given for variety. Bovril added to the milk will make a change, for those to whom it is not taboo. Later, whole milk should be given, at first in a few feeds and eventually at every feed. Raw egg should also be added. Marmite and fruit juice should be given throughout; later other fruits may be added. *This diet should be continued for at least six weeks.* Advances in dietary should only be made if the patient is symptom-free and, if the symptoms recur, the dietary régime must be started from the beginning and advanced again slowly. For dyspepsia give pancreatic emulsion (Savory and Moore), or takadiastase.

Fruit.—This will depend on the country and other circumstances. Strawberries are favoured in England, but apples, bacl, quince, papaya, or bananas can be given in this country. They

should of course be given finely mashed up in the form of a 'fool'.

Sprulac.—This is a milk substance especially prepared, at the instance of Dr. Hamilton Fairley, for sprue patients: it contains the three food principles protein, fat, and carbohydrate in the proportions, P : F : C=1.0 : 0.3 : 1.3. This is a useful substance when fresh milk is difficult to get or is unsatisfactory, but some physicians, and also some patients, prefer it even when fresh milk is available.

It is issued in the form of a powder to which water is added. The dry powder provides 125 calories per ounce: 5 ounces of dry powder suitably diluted with about 8 parts of water, should form the first daily allowance and this should be worked up gradually to about 16 ounces.

Sprulac should be considered only a substitute for the milk part of the above diet.

Fairley's high protein diet.—This diet, which is designed to maintain the high protein ratio, P : F : C=1.0 : 0.3 : 1.3, in place of the normal 1.0 : 1.0 : 5.0, is suitable only in western countries or in large towns where a good meat supply is available.

There are five dietary stages, each of which should be maintained for 1 to 2 weeks or even longer according to the severity of the case.

The main meals are given at 8 a.m., noon, and 7 p.m., but if the patient is very weak they can be divided. As more substances are added, tea is given at 4 p.m., then at 6 a.m. as well, and a mid-morning meal at 10 a.m. is put in. The details of this high-protein diet are reproduced in books on tropical medicine; a summary is given in tabular form below:—

Scott's treatment with calcium lactate gr. xv *t.d.s.* and parathyroid 1/10 gr. *b.d.*, combined with milk diet, has had a number of advocates.

Vaccines have also had their day; Rogers and Knowles claimed good results with streptococcal vaccines, and monilia vaccines have been advocated by the adherents of the monilia theory of the aetiology. Any good effect of vaccines is probably a non-specific action.

The introduction of the sulphanilamide group of drugs has provided another means of attacking the secondary streptococcal infections of the bowel in sprue, and good results have been obtained by the administration of sulphonamide, for example.

The value of liver in this disease was recognized long before the introduction of liver therapy in pernicious anaemia; liver by mouth and perhaps even more so by injection, on account of the defective absorption from the intestinal canal, has a remarkable effect on both the blood picture and the general condition of the patient, but, as we have already said, it is not a specific and dietetic treatment is usually necessary as well.

MEDICINAL AND GENERAL TREATMENT

A purgative may be given at the commencement of treatment, a full dose of castor oil, or pulv. rhei co. If there is any tendency to constipation liquid paraffin, petrolagar, agarol, or one of the *Plantago ovata* group, in the form of *ishabghul*, obtainable in the bazaar in India, normocol or isogel should be given regularly. The atonic condition of the bowel may have led to a constipated condition where

TABLE

Stage	Calories	AT EACH OF THREE MEALS				Additional; at one meal, unless otherwise stated
		Underdone beef, oz.	Rusks, oz.	Glucose, drachms	Oranges (juice)	
1st	770	3	1	2	1	4 oz. soup + ½ lb. liver extract.
2nd	1,280	5	1	2	1	Ditto + 2 oz. calves-foot jelly at two meals + tea with 2 oz. milk.
3rd	1,820	6	1½	2	1	Ditto, ditto + baked apple and 1 oz. custard twice, with tea twice, and calves-foot jelly three times.
4th	2,200	7	1½	3	1	Ditto, ditto, ditto, with soup now 5 oz. and custard 3 oz. and double ration of rusk at one meal.
5th	3,020	7	3	4	1	Ditto, ditto, ditto, ditto + 2 drachms butter, scraped or mashed fruit + 2 drachms honey at two meals, boiled or poached egg.

Specific treatments.—It has been said that there are 365 infallible cures for sprue, which of course means that there is no specific for this disease. A few of the treatments that have been successful in special cases should be mentioned.

there are large faecaliths in the bowel that may necessitate warm oil enemas for their removal.

It is probably not advisable to interfere too much with the *diarrhoea* if it occurs in the early stage before treatment has had time to take

(Continued at foot of next page)

'NEUROPOIETIN PRINCIPLE IN GASTRIC SECRETION'

THE ÆTIOLOGY OF CENTRAL NERVOUS SYMPTOMS IN PERNICIOUS ANÆMIA

By A. N. SHAHA

Bombay

THE extremely common occurrence of symptoms referable to the central nervous system in pernicious anæmia has led most authors to the conclusion that it is a part of the same disease process. It is believed by some that the manifestations in the spinal cord in pernicious anæmia may result from a vitamin deficiency. Others still maintain that there is a specific neurotoxin due to a disturbance in lipid metabolism, or the changes in the central nervous system are related directly to the anæmia.

Recent observations appear to demonstrate the nature of the physiologic defects in pernicious anæmia leading to a deficiency of liver extract—hæmopoietin principle. Failure of the formation of blood in persons with pernicious anæmia has been demonstrated to be due to the absence of a specific reaction, which in the normal person takes place as a result of the presence in the stomach of a specific factor in the food (extrinsic) and a factor in the gastric juice (intrinsic) (Castle, 1929; Castle *et al.*, 1931).

In pernicious anæmia, disturbances of the gastro-intestinal tract and of the central nervous system are associated. Neural (Smithburn and Zervas, 1931; Goldhamer *et al.*, 1934; Baker *et al.*, 1932; Strauss *et al.*, 1935) and sometimes mental symptoms (Lurie, 1919; McAlpine, 1929)

(Continued from previous page)

effect, but later if the diarrhoea is troublesome or disturbs the patient at night kaolin or bismuth and heavy magnesium carbonate should be given.

For *flatulence* and *indigestion*, a mixture of sp. ætheris nitrosi and sp. ammoniæ aromaticus 15 min. of each in half an ounce of peppermint water should be tried first, but if the indigestion persists, in view of the low acidity, an alkaline mixture should be given before meals and dilute hydrochloric acid, half to one drachm, after meals.

For *meteorism* turpentine in minim doses, turpentine stupes, and finally pituitary extract should be given.

Nursing.—Careful nursing will of course form an important part of the treatment and special care should be directed towards the mouth. A potassium chlorate mouth wash, a drachm to the pint, should be used, or if the mouth is painful glycerine and borax, with 2 grains of cocaine to the ounce in extreme cases when the soreness is interfering with the taking of nourishment.

may appear long before the development of pernicious anæmia (Greenfield and O'Flynn, 1933). Ahrens (1932) has stated that early cases of pernicious anæmia would probably at some time show evidence of sub-acute combined degeneration of the cord. The neurological signs (Wood, 1925; Baumgartner and Smith, 1927; Hance, 1930) and degenerative changes in the spinal cord (Reed and Wyckoff, 1926), in cases of pellagra and in sprue resembling those in pernicious anæmia, have been observed. The gastric atrophy and secretory failure classical in pernicious anæmia occur also less frequently in pellagra (Denton, 1928; Lynch, 1930), and in sprue (MacKie and Fairley, 1929; Castle *et al.*, 1935). The observations of Minot and Murphy (1927), Cohn and his associates (1928), Ungley and Suzman (1929), Strauss and Castle (1932) and of others on liver therapy in pernicious anæmia demonstrated an improvement of the anæmia and of the symptoms in the spinal cord. The results of the investigations possibly may lead to the discovery of a physiological principle other than hæmopoietin, which might be involved in the ætiology of central nervous symptoms in pernicious anæmia. Ungley (1931) has suggested that the nervous lesion is due to the lack of some factor other than the effective principle in liver.

The neuropoietin principle is identical with the hæmopoietin principle; in pernicious anæmia both these factors are absent. Salus and Reimann (1934) found that Castle's intrinsic factor was present in five cases with the typical picture of sub-acute combined degeneration of the cord with achylia but a normal hæmatologic picture was observed. They determined the presence of intrinsic factor by reinforcing liver therapy with gastric juice obtained from these patients and feeding it to patients known to have pernicious anæmia. They further determined that Castle's intrinsic factor was not present in seven cases in which sub-acute combined degeneration, achylia and the hæmatological picture of pernicious anæmia were observed. In nine cases with sub-acute combined degeneration of the cord, reported by Russell and his associates (1900), no anæmia was recognized throughout the disease, in others it developed towards the end, while in others it preceded the manifestation of nervous symptoms by many months. They stated that repeated examinations of the blood failed to reveal the alterations found in pernicious anæmia, the changes being those characteristic of secondary anæmia. Schaeffer and Vialard (1929) reported a case in which anæmia was said to be absent and diarrhoea was present; the disease resembled the sub-acute combined degeneration of pernicious anæmia. A case of sub-acute combined degeneration has been reported, in which achylia was present (Thomas *et al.*, 1929). The pathological changes in the stomach of patients with sub-acute combined degeneration are not different from those with Addison's

pernicious anaemia without neurological phenomena (Magnus and Ungley, 1938).

Williams (1914) has stated that besides the familiar gross lesions in the peripheral nerves and spinal cord, pernicious anaemia may give rise to alteration in the brain cells to produce mental symptoms. Warburg and Jorgensen (1929) have stated that there is a chronic pathological condition associated with achylia gastrica which covers a great many cases of neurasthenia and some cases of early psychosis, and that these mental disorders are often associated with mild spinal symptoms, glossitis and megalocytic anaemia. It has been suggested that pituitary deficiency may be followed by achlorhydria, which may induce after a long interval an iron-deficiency anaemia, a liver-deficiency anaemia, cord changes or a combination of these conditions (Snapper, 1937; Snapper *et al.*, 1937).

The occurrence of nervous changes in pernicious anaemia was first noted by Addison in his classical description. Recently, several authors have noted the frequent occurrence of neural changes in cases with pernicious anaemia, noting their presence in over 60 per cent (Smith, 1929; Piney, 1932). Some authors have reported the occurrence of involvement of the spinal cord in 90 per cent or more (Smithburn and Zervas, 1931; Goldhamer *et al.*, 1934; Strauss *et al.*, 1935). According to others (Smithburn and Zervas, 1931; Schilling, 1931; Young, 1932) neural symptoms in pernicious anaemia may develop in 80 to 100 per cent. Woltmann (1919) found that of 150 cases with pernicious anaemia 80.6 per cent presented evidence of the nervous involvement. This was confirmed by Hennerberg (1924) and by Meulengracht (1926).

Cole (1924) in an analysis of 21 cases of pernicious anaemia found lesions in the central nervous system in 87 per cent. Riggs (1924) stated that the nervous disturbances in pernicious anaemia may be observed in over 80 per cent of the cases. This has been confirmed also by the others (Reese and Beigler, 1926). The majority of the investigators are of the opinion that more than 80 per cent of the cases with pernicious anaemia exhibit neurologic manifestations (Baker *et al.*, 1932; Ungley and Suzman, 1929; Grinker, 1926).

Hurst (1934) has stated that the production of the hæmopoietin and neuropoietin substances are very rarely diminished sufficiently to give rise to Addison's pernicious anaemia and sub-acute combined degeneration of the cord, except in very severe cases of gastritis in which true achylia occurs. When gastritis is so severe as to cause complete destruction of the oxyntic cells, it may also destroy the cells which produce hæmopoietin and neuropoietin factors. Gastritis following the operation may be of such severity that the gastric juice is not only neutralized but is no longer secreted, and achylia may then be associated with the absence of hæmopoietin and

neuropoietin factors. Clanwill and Hurt reported a case with duodenal ulcer with hyperechlorhydria, who developed achylia with pernicious anaemia and sub-acute combined

Year	Author	Percentage of cases with nervous symptoms
1893	Minnich (1892) ..	.. 77
1919	Woltmann (1919) ..	.. 80.6
1921	Hamilton and Nixon (1921) ..	.. 75—80
1923	Riley (1923) ..	.. 80
1924	Cole (1924) ..	.. 87
1924	Hennerberg (1924) ..	.. 80.6
1924	Hurst (1924) ..	.. 80
1925	Dixon, Burns and Griffin (1925)	50
1926	Grinker (1926) ..	.. 70
1926	Meulengracht (1926) ..	.. 80.6
1926	Reese and Beigler (1926) ..	.. 80
1929	McAlpine (1929) ..	.. 60
1929	Smith (1929) ..	.. 60
1929	Ungley and Suzman (1929) ..	.. 70
1931	Schilling (1931) ..	.. 80—100
1931	Smithburn and Zervas (1931)	80—100
1931	Suzman (1931) ..	.. 73
1932	Ahrens (1932) ..	.. 90
1932	Baker, Bordley and Longcope (1932) ..	.. 70
1932	Piney (1932) ..	.. 60
1932	Young (1932) ..	.. 80—100
1933	Greenfield and O'Flynn (1933)	100
1934	Goldhamer, Bethell, Isaacs and Sturgis (1934) ..	.. 90

degeneration eighteen months after gastro-jejunosomy. Salus (1932) has reported two fatal cases of sub-acute combined degeneration, but without anaemia which appeared 15 years after gastro-jejunosomy. In these cases free hydrochloric acid was present before but absent after the operations. Another three cases of pernicious anaemia following ileostomy developed sub-acute combined degeneration of the cord (Dixon, Burns and Griffin, 1925).

The ætiological relation between sub-acute combined degeneration and gastric carcinoma (Waterfield, 1923; Shackle, 1923; Hurst, 1923; Garvey and Stern, 1924; Waterfield, 1927; Hurst, 1929; Simpson, 1931; Fisher, 1934), benign tumours of the stomach (Balfour and Henderson, 1927) have been suggested. Hurst (1929) believes that the carcinoma was probably secondary to chronic gastritis, and that the sub-acute combined degeneration of the cord and anaemia resulted from the achlorhydria, which was present before the carcinoma developed. He (1924) reported a case of typical sub-acute combined degeneration with the blood picture of Addison's anaemia, complete achlorhydria and glossitis with gastric carcinoma. In cases of carcinoma of the colon and stricture of the small bowel the hæmatological picture of pernicious anaemia (Becker, 1930; Hurst, 1933) with the

clinical signs of sub-acute combined degeneration (Grinker, 1926; Meulengracht, 1929; Little *et al.*, 1929) has been observed. Meulengracht (1929) has reported a series of 20 cases; the strictures were usually tuberculous and involved the lower part of the small intestine, occasionally the upper part of the colon. The hæmatological picture, the nervous symptoms and the bone marrow were all typical of pernicious anæmia and achylia was present in all the cases. Woltmann and Heck (1937) reported a case who had multiple intestinal fistulas and a faecal fistula following appendectomy; later the blood picture of pernicious anæmia and symptoms of sub-acute combined degeneration were observed. Salus (1932) has reported a case who had stenosis of the small bowel, acquired achlorhydria, a normal blood picture and signs of sub-acute combined degeneration of the cord. This suggests that the stomach plays an important part in the development of sub-acute combined degeneration of the spinal cord in cases of pernicious anæmia. Moreover, the anæmia following the intestinal fistula, stricture of the small intestine, carcinoma of the colon, and of the stomach responds to liver treatment with a reticulocyte crisis and prompt regeneration of the blood (Meulengracht, 1929; Little *et al.*, 1929; Taylor, 1930).

Achylia gastrica is a constant finding in sub-acute combined degeneration as in pernicious anæmia. According to Vanderhoof (1923) and Hurst (1932) there is an almost invariable association of gastric achylia with combined sclerosis of the spinal cord. They suggested that the fundamental cause of spinal sclerosis may be achlorhydria. Sylapka (1922) has reported a case in which the interval was two years before the first signs of sub-acute combined degeneration of the cord and achlorhydria appeared. Greenfield and O'Flynn (1933) have reported a series of 45 cases with sub-acute combined degeneration of the cord, achlorhydria was present in all the cases. Pernicious anæmia was present and 14 per cent of the cases had red cell counts exceeding 4.5 millions. Achlorhydria is a constant finding in both pernicious anæmia and sub-acute combined degeneration of the cord, although a case reported by Hurst (1933) in which degeneration of the cord with Addison's anæmia was associated with normal gastric secretion following chronic obstruction of the ileum. Ford-Robertson (1929) has investigated the incidence of achlorhydria in psychosis; he found that hypochlorhydria was present to a much greater extent than in normal persons.

HEREDITARY AND FAMILIAL

The familial occurrence of achlorhydria with sub-acute combined degeneration of the cord and with Addison's pernicious anæmia has long been known. Records have been published of about 140 families in which two or more members

were affected with pernicious anæmia with or without sub-acute combined degeneration, and 59 families in which one of these diseases occurred in one or more members of a family and achlorhydria in others (Wilkinson and Brockbank, 1931; Conner, 1930).

Wilson (1912) reported a case of a woman with sub-acute combined degeneration, her two maternal aunts had died of pernicious anæmia. Another patient with severe pernicious anæmia but with slight sub-acute combined degeneration, had a brother who was found to have sub-acute combined degeneration with achylia but with perfectly normal blood (Hurst, 1928). Many other such cases have been reported.

ÆTIOLOGY

The ætiology of the changes in the nervous system remains obscure; however, neurotoxin as the causal factor is suggested (Camac and Milne, 1920). While as a result of experimental evidence it is believed that the manifestations in the cord may result from a vitamin deficiency (Gildea *et al.*, 1930; Suzman, 1931). Many authors have long considered the view that pernicious anæmia and sub-acute combined degeneration were due to hæmolysis by toxins elaborated by organisms in the stomach and intestinal tract (Hurst, 1924; Carlson, 1923). Hurst stated that the infection of the intestine with a hæmolytic streptococcus is an essential factor in the production of Addison's pernicious anæmia and degeneration of the spinal cord; but intestinal infection cannot account for the fact that predigested liver is ten times as effective as raw liver in pernicious anæmia (Reimann, 1931).

Vitamin B: Vitamin B is known to have anti-neuritic principle and its deficiency may result in various neural lesions. Zimmerman and Burack (1934) have found that the lesions were produced by deficiency of the heat-stable portion of vitamin B, but not produced by vitamin-B₁ deficiency. The resulting disease is generally associated sooner or later with pernicious anæmia. Neural lesions of peripheral or central type are sometimes associated with chronic alcoholism (Strauss, 1935) with chronic diarrhoea and with gastro-intestinal lesions (Strauss, 1934). Thus the symptoms may much resemble those of pernicious anæmia, but the progress of the neural lesions in a complicated case of pernicious anæmia is arrested by adequate administration of liver extracts especially when given by parenteral injection (Strauss *et al.*, 1935), the development of the neural lesion is undoubtedly a nutritional deficiency. Manifestations of disorder of the nervous system in vitamin-B₁ deficiency are so striking that the condition in experimental animals is usually called polyneuritis. However, the nervous symptoms appear late in the deficiency and rats kept without vitamin B₁ may die without nervous lesions (Wolbach,

1937). Recent work seems to indicate that the fat content of the diet may be an important factor in vitamin B₁ in relation to the production of polyneuritis in rats (McHenry, 1937; Salmon and Goodman, 1937). The profound functional disturbances of the nervous system and speedy recovery with treatment indicates that vitamin B₁ is directly concerned in the physiology of the neurons. Wolbach (1937) showed that in pellagra lesions of the nervous systems are found; they are not pathogenic in character but are degenerative in type. In long-standing cases of pellagra degeneration of the spinal cord may occur. Petri and his associates (1937) showed that the removal of the stomach in young dogs and swine developed a chronic fatal disease regarded as pellagra, with changes in the nervous system. Since these changes are resistant to oral treatment with vitamin B₂, but rapid improvement followed administration of neutralized stomach juice; the symptoms seem attributable to the loss of a specific gastric factor. They believe that neuropoietin principle is probably the anti-pellagra factor.

The production of polyneuritis in dogs given a diet deficient in vitamin B has been shown by Cowgill (1912). Gildea and his associates (1930, 1935) carried out the experiments on dogs and produced neurological signs, and lesions of the spinal cord, somewhat resembling those of sub-acute combined degeneration, were produced by the prolonged restriction of vitamin B in the diet. The affected dogs always had free hydrochloric acid in the gastric contents and oral administration of vitamin B prevented the progress of the neural symptoms. While with the rare exceptions the use of vitamin B in the treatment of the neural lesions in pernicious anaemia with achylia gastrica has been unsuccessful (Fouts *et al.*, 1934; Fouts *et al.*, 1932). Zimmerman and Burack (1932) have failed to confirm these observations. Somewhat similar changes in dogs with chronic black tongue and macrocytic anaemia have been observed (Crane-Lillie and Rhoads, 1934). In some cases of sub-acute combined degeneration there is also evidence of polyneuritis. Douthwaite (1936) suggested that the health of the peripheral nerves is, like that of the spinal cord, dependent upon an adequate supply of neuropoietin or of some allied substance from the gastric or duodenal mucosa. McAlpine (1929) showed that the neurotoxin associated with pernicious anaemia may attack all parts of the nervous system, cerebrum, spinal cord and peripheral nerves. In sub-acute combined degeneration peripheral nerves are generally affected. Hurst (1928) has stated that in three patients with pernicious anaemia the achlorhydria may have resulted from chronic alcoholism. Strauss (1935) has stated that his 10 cases who were suffering from alcoholic polyneuritis were given spirituous liquor, concentrated vitamin B, and liver extract by

parenteral injection. Improvement in the polyneuritis occurred in every person. Ossenkopp (1931) reported a case of chronic alcoholism with symptoms of multiple sclerosis, but the pathological picture was atypical. It has been suggested that vitamin-B₁ content of the blood is normal in cases of pernicious anaemia with or without sub-acute combined degeneration, and in these conditions poor therapeutic results have been found (Ungley, 1938; Sinclair, 1938; Rowlands and Wilkinson, 1938).

Vitamin A: In animals fed with diets deficient in vitamin A there may also develop abnormal neurologic signs. That the curative and preventive effect of whole liver in sub-acute combined degeneration is due to a fat-soluble factor, probably vitamin A, one therefore quite distinct from the water-soluble factor which is curative of the blood condition in pernicious anaemia (Suzman *et al.*, 1932; Mellanby, 1930). Mellanby (1930) described the production of degenerative changes in the central nervous system by diets rich in cereals and deficient in vitamins. With the diet deficient in vitamin A, white maize resulted in degenerative changes, while with the yellow maize the cord was normal.

Recently, Einarson and Ringsted (1938) showed that adult rats fed on diets free from vitamin E for a long time developed certain neurological disturbances. When the treatment of wheat-germ oil was begun within the first week of the special feeding paresis did not develop, but if the treatment was begun after eight weeks of this feeding paresis appeared six to eight weeks later. Although there is evidence that lack of vitamins A and B may be followed by certain degenerative changes in the nervous system, these vitamins alone are ineffective in the treatment of sub-acute combined degeneration.

The substance in liver extract necessary for the nutrition of the nervous system is distinct from the haemopoietin factor. Ungley and Suzman (1929) stated that the lesions in the nervous system are probably the result of a conditioned deficiency. They found that the liver had a direct effect on the neurological manifestations; completely destroyed axis cylinders in the central nervous system cannot regenerate however, but the function of the cord may improve. Grinker and Kandel (1934) have shown that liver therapy is not efficacious in improving or preventing degeneration in the nervous system complicating pernicious anaemia, and that liver cures the mental symptoms of pernicious anaemia which are usually caused by the anaemia. Sturgis and his associates (1927) showed that in a series of cases with pernicious anaemia and sub-acute combined degeneration, the administration of liver or liver extract produced no change in neurological signs, although the regeneration of the blood was observed. Baker, Bordley and Longcope

(1932) reported that 61.5 per cent of their cases showed improvement and 36 per cent failed. Farquharson and Graham (1930) stated that liver therapy has a specific effect on the nervous lesions, arresting their progress in virtually all cases and causing marked improvement in large numbers. However, complete recovery has not occurred after definite nervous manifestations. Many authors have reported distinct improvement in the nervous symptoms with large doses of liver (Minot and Murphy, 1927; Ungley and Suzman, 1929; Strauss and Castle, 1932; Starr, 1931; Bubert, 1928). While others have found improvement following the administration of desiccated stomach and liver extract (Smithburn and Zervas, 1931; Baker *et al.*, 1932), vitamins (Fouts *et al.*, 1932; Davison, 1931) and brain diets (Ungley, 1931). Ungley (1931) has found that the hæmopoietic potency of brain was only one-third of that of liver. Later, he (1932) stated that the effect of brain upon the nervous system is markedly greater than that of liver.

CONCLUSION

Neuropoietin principle is normally present in gastric secretion; its chemical nature is unknown. It has not been shown to be Castle's intrinsic or extrinsic food factors. It is secreted by the glands in the pyloric end of the stomach and by the fundus. It is stored in the liver and in the brain, and acts in the same way as hæmopoietin to form a substance essential for the normal nutrition of the central nervous system. It is clear that the possible effective factor in liver and in brain is not vitamin A, since liver and brain contain little or none of this vitamin.

In Addison's pernicious anæmia the intrinsic factor of Castle is almost always absent and this is generally associated sooner or later with the absence of neuropoietin principle. Castle's factor may be absent in cases with pernicious anæmia, but it may be present in other macrocytic anæmias; it is thus explained why the majority of cases of pernicious anæmia may develop sub-acute combined degeneration of the cord. In the anæmia of the macrocytic type, such as tropical nutritional anæmia, degeneration of the cord does not occur. Vaidya (1930) reported 149 cases with tropical pernicious-type of anæmia, only in one case were there symptoms of sub-acute combined degeneration.

Achylia gastrica is a constant finding in sub-acute combined degeneration as in pernicious anæmia. In experimental animals removal of the stomach, or cases of gastric atrophy with achlorhydria may not lead to pernicious anæmia or sub-acute combined degeneration of the cord, because there is a reserve in the duodenum to maintain function. In cases with pernicious anæmia in which the secretion of neuropoietin and hæmopoietin factors has not returned after treatment, the glands in the pyloric end and fundus of the stomach are degenerated, and

regeneration of the central nervous system is impossible after a certain degree of injury has occurred.

In animals fed on deficient diets there may also develop neurological signs and pathological lesions of the central nervous system resembling those seen in pernicious anæmia. However, there is no evidence that vitamins and the hæmopoietin and neuropoietin factors are in any way related. The hæmopoietin and neuropoietin factors contained in the liver or in the brain are extremely unlikely to have any connection with vitamin A, B or E. There is no evidence that toxins are absorbed in pernicious anæmia or in sub-acute combined degeneration of the spinal cord.

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Medical News

STATISTICAL YEAR-BOOK OF THE LEAGUE OF NATIONS, 1933-39

In the *Statistical Year-Book of the League of Nations*—which has appeared regularly since 1927, and of which the 1933-39 edition has just been issued—the Economic Intelligence Service provides a large and very varied amount of statistical information of interest both to specialists and to the general public.

The Year-Book deals with a large number of subjects. The statistical tables, carefully kept up to date, relating to the territories and populations of all countries in the world and to the natural movement of those populations, are of very general interest. The statistics of production, consumption, trade, exchange

injection should not be given in any circumstances. It is very easy to reduce the stools and produce apparent comfort by paralysing the intestine, but this may result in ileus and toxic absorption, which are practically always fatal in ulcerative colitis.

Various bismuth preparations and aromatic mixtures are in use. Of these the best are *mistura cretæ*, bismuth salicylate and aromatic sulphuric acid. They are of some value in the later stages and in mild forms.

Kaolin and charcoal are of some use with offensive stools. In any case they are probably harmless by the mouth and afford some satisfaction to the patient. True antiseptics can scarcely be expected to have any useful effect on the colon.

Emetine is definitely contra-indicated and should never be employed.

Numerous other drugs are in use and such preparations as soured milk. It is possible that some of these are of value in milder forms and slight relapses.

BLOOD TRANSFUSION

Blood transfusion is of great value in ulcerative colitis and its wider use in recent years is a most valuable advance in treatment. It is, of course, obviously indicated in cases of gross hæmorrhage. But it should also be used in a common group of cases where the hæmoglobin is reduced, say, to 60 per cent, a figure which does not involve any danger to life from anæmia but is sufficient to cause a grave diminution of strength.

VACCINES

Neither in severe or mild forms nor at any stage have I seen any good results from the use of vaccines.

DYSENTERIC SERUM THERAPY

Some good results have been recorded in cases with an acute onset following injections of anti-dysenteric serum. Its use rests on the belief that ulcerative colitis is initially due to infection with dysentery organisms. Good results are only obtained in very occasional cases and may be due to protein shock.

IONIZATION

Good results have been claimed for this method of treatment. It is probable that its action is mainly psychological.

COMPLICATIONS AND SPECIAL SYMPTOMS

Pain.—Pain is not a common feature except in the early stages with an acute onset. It may then be very severe before a motion. If there is much complaint of pain in later or more chronic forms one should think of psychological factors.

Vomiting.—This is a serious symptom as it may indicate involvement of the small intestine and stomach and interferes with nutrition. The diet perforce must be restricted, but no definite rules can be laid down.

Incontinence of fæces.—This, again, is a serious complication as it interferes with colonic treatment. No attempt must be made to continue colonic irrigation. If it persists operation may be unavoidable.

Paralytic ileus.—This is an extremely serious complication with a high mortality. It is especially liable to develop after injections or overdose with morphia. For a time the patient usually asserts that he is much better, and he appreciates the reduction in the number of stools. Treatment should be on the usual lines for this abdominal complication. It need scarcely be stated that the passage of the so-called long rectal tube is barbarous, useless and dangerous.

Anæmia.—The correct treatment for anæmia in the acute stages is by blood transfusion. Iron is rarely well tolerated and the risk of disturbing the appetite and digestion is considerable.

Nervous disturbances.—The psychology of the patient must be considered in all types of ulcerative colitis. An initial acute attack, a relapse or resistance to treatment may all be associated with nervous disturbance.

Clinical variations.—Mild cases may be met with in which treatment may be ambulatory and the frequency of the motions controlled by simple measures. There is a difficult group of cases in which an occasional stool is passed, typical of ulcerative colitis, the remaining motions being normal. This may be seen in the later stages of treatment, suggesting that a portion of the intestine is still in active ulceration. It is not uncommon as a chronic form existing over long periods in young women, and in this case there is frequently a psychological factor. Such cases may be resistant to all treatment, but they are usually compatible with considerable activity.

Constipation.—This is best dealt with by temporarily relaxing any active treatment. A colonic wash is not always sufficient. Liquid paraffin is usually successful, but cases are by no means uncommon in which it disturbs the digestion and in other cases seepage may be troublesome. Taxol is a very good gentle laxative. Obviously, no strong aperient is permissible.

Arthritis.—This is by no means an uncommon complication. It clears up spontaneously and no special treatment is indicated.

SEQUELÆ

The commonest sequelæ are hæmorrhoids, fistula and fissure which need appropriate treatment. Polyposis is a rare complication which develops in very chronic cases. It may produce severe hæmorrhage and apart from this there is some risk of the development of malignancy. Polypi consequently have always to be treated. The cautery is sufficient if they are within reach.

SURGICAL TREATMENT

Operation should not be regarded as the routine treatment for there is no doubt that the usual surgical procedures directed towards resting and washing the affected colon are unsatisfactory. Such operations, however, may save a life which would be lost under medical treatment. Steady deterioration in the general condition, loss of weight, severe hæmorrhage and possibly persistent abdominal pain are indications for operation. There are many forms of operations designed to rest and wash the colon, but in all cases it is essential that the opening should be made above the diseased area.

Undoubtedly, the most satisfactory surgical procedure is resection of the affected colon. The mortality is by no means as high as might be expected, even when the entire colon is removed, and the operation has proved successful in cases which appear to be desperate. Obviously such an operation must not lightly be advised, but the possibility should be borne in mind in all chronic cases in which there is evidence that a large portion of the colon is involved.

Prevention and Treatment of Bed-Sores

By V. ZACHARY COPE, M.S., F.R.C.S.

(From the *British Medical Journal*, 8th April, 1939, p. 737)

A BED-SORE is an ulcer or area of impaired nutrition of the skin and subcutaneous tissues due mainly to the too great or prolonged pressure on those parts of the body that are most subject to pressure when the patient lies in bed. The body is not homogeneous in consistency nor does it lie evenly on any ordinary mattress which may support it; some parts of the skeleton project and take more than their fair share of the weight, and it is over such projections that bed-sores form. If the weight of the body could be evenly distributed over the whole of the surface that is in contact with the mattress, bed-sores would be exceedingly rare. The nearest approach to this even support results when a plaster-mould of the posterior half of the body is fashioned and the patient is allowed to lie on the mould. If the plaster be correctly made it is possible for the patient to lie on it for months without changing position or having any attention paid to the back, and at the end of that time

the skin of the back will be quite intact and healthy. Consideration of this fact throws much light upon the principles which should guide us in the prevention and treatment of bed-sores.

A bed-sore is really a form of pressure-gangrene, but though pressure is the main factor there are important subsidiary points to be considered. These subsidiary factors may be external or internal. External factors consist chiefly of slight traumata caused by the friction of clothes or irregular rucks in the sheet upon which the patient lies; and the irritation of the skin by urine, feces, or sweat. Quite apart from the irritation which may be caused by these, the moisture softens the superficial epithelium and makes it less resistant to pressure. The internal or constitutional factors consist of those diseases which lower the blood pressure or diminish the vitality and blood supply of the tissues. This is a large group of conditions comprising all debilitating diseases and a very important group of nervous diseases (especially paraplegia) in which the absence of sensation and the impossibility of normal vasomotor reaction make the prevention of bed-sores extremely difficult. It is also clear that emaciated patients whose bones project more than usual will be more prone to develop bed-sores.

The most common positions for bed-sores are in the region of the sacrum, over the prominences of the scapulae, the heels, and the back of the head, and over any vertebral spine which may be at all prominent. A sore may develop over the elbow or the iliac spine, and if the patient lies on his side a sore may appear over the great trochanter. It must be remembered that the nutrition of any part which is subjected to continuous pressure may suffer, and the medical attendant must keep watch for the effects, which will vary according to posture the patient may adopt.

The diagnosis of a well-developed bed-sore is, as a rule, quite easy, for the unhealthy ulcer which often spreads from some focus of pressure tells its own tale. It is much more important to recognize the earlier stages when the sore either threatens or is inevitable. When a sore is threatening to develop the skin will be found to be slightly reddened and tender; the redness will disappear on digital pressure and will reappear when the pressure is removed. This follows from the fact that the first stage is merely an erythema or congestion and the vascular supply is still intact. When a sore is inevitable the colour changes to a dusky or purplish red, and since the circulation in the part is arrested the pressure of the finger will not be followed by the phenomenon described above: there is capillary stasis. When this stage has been reached it is inevitable that some necrosis of tissue and consequent ulceration will result. In some cases a sore begins as a small crack in the skin from which ulceration spreads.

PREVENTIVE MEASURES

In no department of medicine is the proverb 'prevention is better than cure' more applicable than in the case of bed-sores. In the great majority of cases it is possible, and customary, to prevent them; and with well-trained nurses it is usually considered a reflection on their nursing capacity if a sore develops. The nurse prevents bed-sores in three ways: first, by avoiding undue pressure on any one part; secondly, by preventing the infliction of minute traumata; and, thirdly, by improving the circulation and increasing the resilience and elasticity of the skin. It is the doctor's part to improve the general condition and vitality of the patient, and to give advice when sores threaten or form.

Avoidance of undue pressure

For this purpose it is necessary to see that the mattress is firm enough to prevent the body sinking deeply into it, and yet soft enough to allow it to be moulded to the contour of the patient's body. A firm hair mattress is customary. In those cases of very ill or feeble patients where special care is necessary a water-bed is sometimes used. The water-bed, which

is put on top of the ordinary mattress, must only be half filled with water (at 100°F.). A fully filled water-bed would be as objectionable as a very hard mattress, and one less than half filled would allow too much sagging of the body. Water-beds are rather troublesome and many prefer to use a pneumatic mattress or, more commonly, air-cushions instead. Circular air-cushions or circles of sorbo-rubber are used to take the pressure off any particular part; air-cushions must be only half filled with air, and must form a large circle, with the affected part in the centre. Too small a cushion may cause oedema of the included part and actually do harm. Cushions must be well covered with linen. There are on the market some horseshoe-shaped rubber cushions (Dunlopillo), that are designed to obviate oedema of the included part.

Change of posture in bed

Normal people always change their position in bed as soon as any discomfort indicates the need for it. Sick patients cannot do this, so the nurse must do it for them in order to avoid too prolonged pressure on any one part. In altering the position of a patient the body ought not to be rolled over, but rather lifted gently so as to effect the change.

Avoidance of minute traumata

The greatest care must be taken to avoid slight injury to the skin when the bed-pan is used; in persons who are recovering from an anaesthetic and in those who are paraplegic it needs a careful hand and a vigilant eye to see that the skin is not damaged by hot-water bottles. Dry bread-crumbs or rucks in the sheet or draw-sheet may cause unnecessary friction. The rather rough way in which an abdominal binder is pulled from under a patient who is about to undergo an abdominal operation might cause dangerous friction to the sacral region; in such cases the patient ought to be gently raised while the nurse withdraws the binder.

Maintenance of normal condition of skin

This is done by keeping it clean and dry, by massaging and in some cases hardening it. In an ordinary patient the pressure-points are attended to twice daily (morning and evening) and after the bed-pan has been used. In feeble patients and in those who are incontinent the toilet must be done every four hours or even every two hours. The special areas, particularly the sacral region, are washed and gently and firmly massaged by the palm of the hand and the pulp of the fingers working in the lather formed from white Windsor or other good soap; after five or ten minutes' massage the soap is washed off, the skin dabbed with a dry clean towel, and some form of spirit is then rubbed into the skin. Usually ordinary methylated spirit is used, but eau-de-Cologne or even brandy may be employed if wished. After the spirit has been well rubbed in, the part is thoroughly dusted with talcum powder or similar preparation.

With incontinent patients it is of the utmost importance to keep the skin dry. The draw-sheet must be changed frequently and frequent attention given to the skin. Usually a preparation of equal parts of zinc ointment and castor-oil is applied with the object of keeping the skin dry, but such ointment is disliked by some in that it may soil the linen; this soiling may be avoided if the ointment be used sparingly. When a bed-sore is threatening every effort must be made to change the position of the patient so that the affected part is relieved of pressure, and the skin must be attended to at least every two hours.

TREATMENT OF THE INEVITABLE BED-SORE

When, by the discoloration of the skin and the demonstrable lack of capillary circulation, it is recognized that a bed-sore is inevitable, it is recommended by Latimer that the area be hardened by means of tannic acid solution. A 5 per cent aqueous solution is sprayed on at half-hourly intervals and the part dried. Air provided by suction from electric light source. This method of

treatment is less likely to be followed by sepsis than when the part is treated by fomentations. The dried slough will ultimately separate and leave an ulcer, which can be treated by one of the methods here described.

When a definite sloughing ulcer is present it must be specially treated in one of the following ways. For small and even moderate-sized there is no doubt that the application of elastic adhesive plaster, as advocated by Carty, is useful.

'Two pieces of elastic adhesive plaster, one over the other, are applied so that the bed-sore and the skin surrounding it for at least an inch are covered. The elastoplast is left in position as long as it will adhere—usually, in the early stages when the discharge is plentiful, twelve to forty-eight hours. It is then replaced by similar pieces of adhesive plaster, and this is repeated until healing is complete.'

If the elastoplast treatment is adopted it is essential to see that the whole of the ulcer and a considerable area of healthy skin round it are completely covered up; and the plaster must not be removed to see how the ulcer is progressing. Only when it becomes loose should it be replaced by a new piece or pieces. By means of this treatment large and deep ulcers may sometimes be induced to heal. Latimer points out that the elastoplast method is not suitable for cases in which there is involvement of bone, virulent infection, or profound necrosis of tissue. If the elastoplast treatment is not adopted the above-described tannic acid application may be tried.

There are still many who prefer to treat bed-sores by the older-fashioned methods of astringent or antiseptic applications. There are many to choose from. Dakin's solution helps to separate the sloughs and clean up the surface of the ulcer. Hypertonic saline solution (5 to 10 per cent) has been recommended. A dilute solution of aluminium acetate is astringent and slightly antiseptic; Burow's preparation is a 5 per cent solution of this chemical, and is too strong—it must be diluted ten times before application. Good results have been claimed also after application of dusting powders containing rhubarb or catechu, dermatol or aristol. I hold no particular brief for any of these applications, but think that healing may take place with any of them and many others. The chief point is to keep the surface of the ulcer clean and free from pressure. When the ulcer is quite clean the application of lotio rubra hastens healing.

In addition to local applications healing may be hastened by the use of artificial sunlight or ultra-violet rays to the part. When there is a large slough it may be advisable to cut it away, but that is about as much surgical intervention as is ever required.

Diet in General Practice with Special Reference to the Amount of Food Given

By L. COLE, M.D., F.R.C.P.

(From the *British Medical Journal*, 22nd January, 1938, p. 158)

THE results of treatment by diet are often very different from those aimed at. Sometimes this is because the main idea has been obscured in a mass of comparatively unimportant detail, but more often it is because alteration in one direction has led to deficiency in another. Such errors cannot be avoided unless the constituents of a normal diet are constantly kept in mind, and for this reason these will first be briefly given.

THE NORMAL DIET AND ITS CONSTITUENTS

For a diet to be normal it must contain enough food. Perhaps it is because this is so obvious that it is so often forgotten. The actual amount required by different people varies much more than books on physiology lead one to suppose. The diet for an 'average man' approved by a committee of the Royal Society consists of 100 grammes of protein, 100 grammes of fat, and 500 grammes of carbohydrate. This has a total energy value of 3,400 calories. Many

people can maintain health on a much smaller allowance of food or of protein than this, and the tolerance and requirement of fat also vary greatly. The amount of carbohydrate varies very widely, too, but it should always be enough to ensure normal metabolism of fat, and for this the ratio of carbohydrate to fat should not fall below that indicated by Woodyatt's formula: $F = 2C + \frac{1}{2}P$. Finally, in considering quantity it must be remembered that excess may be as harmful as lack.

The importance of vitamins seemed at one time to be overstressed. Recent work, however, by Harris Archer and Graham, and others has shown that minor degrees of vitamin deficiency are all too common, and that they often occur in patients on special diets in which the normal vitamin requirement has been overlooked. Diets given in gastric cases are extremely liable to be deficient in vitamin C, and low-residue diets in vitamin B, unless this particular danger is realized and the deficiency corrected. In all diets, therefore, the possibility of such deficiency must be considered.

Every diet must contain certain inorganic constituents, and of these iron, iodine, calcium, and sodium are the ones of which a deficiency may occur. When it does it may result from failure of absorption or excessive loss rather than from actual deficiency in the diet. Witts and others have shown how rapidly many forms of anemia respond to large doses of iron, but that such response only occurs when the amounts given are far and above those taken normally. Lastly, every normal diet should contain sufficient roughage, hard food to develop the jaws and keep the teeth healthy, and water.

DEFICIENCY THROUGH DIETING

Restriction of diet in one direction may lead to deficiency in another, and the most common of these untoward effects is the result of reducing the food to an amount below the optimum necessary for health. In some cases the reduction is so severe that actual weakness from lack of food occurs. This may happen with diets given for various conditions. In the artificial feeding of infants with diluted milk it is very easy to bring the caloric value too low without realizing it, unless calculations are made to check this. The following is an example of such a mistake:—

A premature infant weighing six pounds failed to put on weight. She had been given six feeds in the day, each feed amounting to three ounces, consisting of one part milk and two parts water and half a drachm of sugar; half a drachm of cod-liver oil emulsion was also given daily.

For rough-and-ready reckoning it should be remembered that the child of 6 months or under requires approximately 50 calories per pound, and that one ounce of cow's milk or human milk produces 20 calories, one drachm of sugar 15 calories, and one drachm of fat 30 calories. In this case the calorie requirements were 300. The child was actually getting six ounces of milk, 120 calories; three drachms of sugar, 45 calories; and half a drachm of fat, 15 calories; total, 180 calories, or about 120 short of the theoretical requirement. The replacement of water by another ounce of milk per feed, bringing the total calories up to 300, rapidly produced a normal gain in weight. Minor deficiencies through too great dilution of milk are not uncommon, but they can easily be avoided if such a method of calculation is used. When breast-fed children fail to thrive the cause is often too little milk. In such cases the importance of test feeding to find out exactly how much food is being given cannot be over-emphasized.

Diets for gastric and duodenal ulcer cases afford another example of quantity deficiency, particularly those given in the early stages, consisting mainly of milk. In order to maintain strength and weight and promote healing it may be well to give 2,000 or more calories a day. One pint of milk produces approximately 400 calories, so that five pints will be necessary if the diet consists entirely of milk. This diet is difficult and trying for the patient, and so far as the

ulcer is concerned there is no reason why more concentrated fluid feeds, variously flavoured and thickened, should not be given. Cream and olive oil, for example, are high-caloric foods of great value. The difference between a diet of, say, 1,000 calories and one of 2,000 may be that between healing and failure to heal; while the lower diet, if continued for long, may make convalescence slower than it need be. Discretion must be used, particularly at the very beginning of treatment, but fuller diets are nearly always well tolerated.

In patients with chronic nephritis and high blood pressure it is not unusual to find that all red meat has been forbidden. If the diet previously has been a very full one and has contained much red meat it is clearly rational to reduce this in order to throw less strain on the kidneys, liver, and heart, but in so doing it must be remembered that to cut off the main source of protein drastically is often to cause a feeling of weakness and depression that is worse and more disabling than the actual symptoms of the disease. Moderate restriction is sound, but the benefit resulting from drastic restriction is at the best nebulous, and is not justified if it produces symptoms. Many patients who have been thus severely treated feel fitter and better in every way when their burdens are lightened. If a patient has been accustomed to take meat three times a day he will probably feel better if he is allowed it once a day rather than not at all.

DIET IN DIABETES

In the treatment of glycosuria, whether diabetic or not, excessive dieting is one of many pitfalls. It is very important to make a correct diagnosis before symptoms are masked by what may be excessive, even unnecessary, restriction. Many cases of glycosuria are innocuous and do not need treatment, but are dieted unnecessarily; the symptom has been blindly treated without an investigation of its cause. The following is an extreme example of this mistake:—

A man of 40 was sent to the out-patient department suffering from mild hyperthyroidism and chronic pulmonary tuberculosis. Sugar had been found in his urine, and because of this finding his loss of weight had been attributed to diabetes mellitus, and a diet of 100 grammes of carbohydrate, 75 grammes of protein, and 150 grammes of fat given. The glycosuria was actually a symptom of hyperthyroidism, and with his raised metabolism, chronic infection, and restricted diet he was going rapidly downhill. A change to a high-caloric diet with plenty of carbohydrate led to rapid improvement and ultimately complete recovery.

Except in severe cases of diabetes mellitus it is important that investigations of blood sugar and urine should be made before the diet has been altered, so that the correct diagnosis may not be masked by treatment. Once the diagnosis of diabetes mellitus has been made the test of good treatment is whether the patient feels absolutely fit, is able to do full work, and maintains a constant weight. If a normal blood sugar and freedom from glycosuria can also be maintained so much the better; but fitness and efficiency are more important than these, and some of the latter standards may have to be sacrificed. Extreme introspection or neurasthenia is too heavy a price to pay for a normal urine, and in such cases some laxity is preferable. It is desirable, however, that freedom from ketosis should always be maintained.

In diabetics, as in normal people, there is extreme variation in the amount and type of food required, and the best diet for a particular patient must ultimately be found by trial. In patients over 45 the question whether insulin is necessary often arises. In such borderline cases the diet which they can take and still be sugar-free is barely enough to keep them fit and active. Again decision is by trial and error, but it is a pity to allow patients to struggle on without insulin, under-nourished but sugar-free, when with insulin they could take a fuller diet and feel well. When they develop an infection many such patients will have glycosuria and need insulin; they should

therefore be taught how to use it, so that they may take it at once without fuss should occasion suddenly arise. In old people with diabetes it is undesirable to reduce the blood sugar suddenly either by diet or by insulin. Many feel better with a permanently raised blood sugar, and the danger of over-dieting even when glycosuria is present must not be forgotten.

DIET IN OTHER CONDITIONS CAUSING OBESITY

In contrast to the diets in which inadvertently too little food is given I would direct attention to those in which the aim is reduction of weight. 'Reducing' diets have a wide application, not only for the treatment of obesity as such but in the treatment of other conditions in which a moderate increase in weight often escapes notice. It is of those 'other conditions' that I want particularly to speak.

From a theoretical standpoint increase in weight seems likely to lessen physical capabilities in certain directions. The mere addition of a stone means that more work has to be done, throwing extra strain on the circulatory and respiratory systems for which there is no return. To those of sedentary occupation or inclination this may tip the scales on the side of increasing weight and decreasing activity, a vicious circle which once started, may be difficult to break. The deposit of superfluous fat, particularly around the hip and shoulder girdles and in the abdomen, leads often to degeneration of posture, which predisposes to bad breathing and visceroptosis. Bad breathing, a lax abdominal wall, and diminished activity interfere with the return of blood to the heart. This is normally brought about by muscular movement of the limbs, the descent of the diaphragm during inspiration—which, when the abdominal wall is of good tone, raises the intra-abdominal pressure and drives blood towards the heart—and the negative pressure in the great veins towards the end of inspiration. This effect is shown by the tendency of such patients to develop varicose veins and hæmorrhoids. And yet how often does one see varicose veins treated but no attempt made to correct the obesity posture or visceroptosis. Further, the output of the heart is dependent on the venous return, so that the whole circulation is likely to suffer. Increased deposit of fat and diminished activity also has its effects on joints, muscles, fasciæ, and tendons, allowing adhesions to form which interfere with the blood supply, so paving the way for chronic rheumatic affections, such as 'lumbago', 'neuritis', and 'sciatica'.

RELATIVE CARDIAC INSUFFICIENCY IN OBESITY

Proger and Denny have made an experimental study of the factors responsible for the so-called relative cardiac insufficiency in obesity. They compared three obese with three normal patients, with the following results:—

The vital capacity in the obese was from 12 to 25 per cent below normal, according to whether height or surface area standards were used. The respiratory minute volume, while the same in both groups at rest, showed an average increase of one-third in the obese during mild exercise. The respiratory rate per minute in the normal and obese during mild exercise was 17 and 18 respectively. The oxygen consumption was definitely greater in the obese during exercise, and was more than could be accounted for by the greater work associated with the extra weight or higher respiratory rates. The resting pulse rate tended to be higher in the obese.

If obesity produces these effects in patients whose hearts are healthy its effect on those with a weak or damaged myocardium becomes clearer. The opinions of many distinguished physicians might be quoted in support of the view that obesity tends to shorten life. Rolleston says: 'The long-lived are usually spare and seldom fat, having been thin since middle age'. It is also supported by life insurance figures. MacLaren says that cerebral apoplexy, Bright's disease, nephritis, cardiac disease of uncertain nature, and diabetes mellitus all give a much higher mortality in those over weight. It is supported as well by the biologist.

Robertson and Ray have shown, in white mice, that those with relative paucity of tissue accretion in late life tend to be long-lived. From the evidence there is little doubt that in many the tendency to put on weight is a degenerative change. This is a particularly important point, because in numerous cases it can be prevented.

THE CAUSES OF OBESITY

Before considering treatment of obesity, however, it is essential to discuss its causes. Du Bois has divided cases into two main groups: endogenous or constitutional, in which there is frank endocrine abnormality; and exogenous, in which no such cause can be recognized. These groups merge into each other, and while the extremes can be recognized there are a large number of cases in which it is impossible to say how far the exogenous or the endogenous factors predominate. The tendency to put on weight is one of the most variable characteristics in different people; one can eat as much and do as little as he likes and his weight does not vary; another has but to eat an extra potato or omit his daily walk and his weight rises. Such tendencies often run in families, and may be likened to other hereditary metabolic disorders such as diabetes or gout. Whatever may be the primary cause, it is certain that in most people gain or loss depends on supply and demand, the amount of food absorbed and the amount of energy used. The effect of variation of food and exercise differs so much in different people that it is impossible to predict with certainty the result of a particular regime in a particular patient, and the effect must be determined by trial and error. In nearly all cases, however, a decrease in the fat-forming elements of the food—carbohydrate and fat—with increased exercise will cause a loss of weight, but the degrees of each required must be found by experiment.

A word must be said here on the use of thyroid gland in obesity. This is valuable when there is hypothyroidism and in some patients who put on weight at the menopause. When, however, there is no thyroid deficiency thyroid extract should only be used as an adjunct to treatment by diet, massage, and graduated exercises, and in most cases it is unnecessary. If these measures fail, then a careful trial of thyroid is advisable. Treatment of obesity with thyroid alone is usually unsuccessful unless the dose is pushed, and then it may be dangerous. Poulton suggests that many obese subjects, far from possessing a low metabolism, have it slightly raised. To give thyroid in such conditions without reducing weight may mean that still more work is thrown on a heart which has already too much to do. The patient remains fat and feels very ill.

METHOD OF REDUCING WEIGHT

Reduction of weight may be said to depend on the application of these principles. Fat formation is prevented by having less fat and carbohydrate in the diet, and metabolism is stimulated by giving protein and increased exercise. Only if these methods fail should artificial stimulation of metabolism by thyroid be resorted to. In actual practice this means that the diet is made up mainly of lean meat, fruit, and green vegetables, with only enough sugar, starch, and fat to prevent feelings of weakness or hunger. In putting patients on such a diet it is wise to begin slowly so that adjustment to the change may be gradual: the degree of change depends on the individual, but once a diet is found that produces a steady fall in weight there is no need to make it more drastic. The scales are the best guide.

The following example shows the method in practice:—

A woman, aged 50, with obesity; weight 14 st. 6 lb. There was no evidence of endocrine abnormality. On 3rd July, 1937, she was put on a diet of lean meat, fruit and green vegetables, with 140 grammes of carbohydrate per day. By 31st July there had been no change in weight, and the carbohydrate was reduced to 80 grammes. On 14th August her weight was

14 st. 5 lb., so the carbohydrate was further reduced to 60 grammes. On 16th October her weight had fallen to 13 st. 4 lb.

Increase in exercise should also be gradual. Graduated exercises, designed where necessary to improve breathing and posture, should if possible be taught and supervised by a qualified masseuse, supervision being relaxed as the patient becomes proficient. It is essential that such exercises should be done regularly at home every day. Other exercises, such as walking for prescribed distances, cycling, or riding, are valuable, and the degree to which these are necessary must be found by trial in each case. The scales and the patient's feelings are again the best guides. In patients with excessive abdominal fat a surgical belt is often a great aid to increased activity.

In ten consecutive patients with uncomplicated obesity treated as out-patients at Addenbrooke's Hospital during the last year for periods ranging from twelve to forty-eight weeks the average loss of weight was 25 lb. each. Reducing diets and graduated exercises were used in all cases, and in only two were small doses of thyroid given in addition.

Occasionally patients do not respond, and these often come from families in which there is a strong familial tendency to obesity. Before beginning treatment careful inquiry into the family history will be of importance as a guide to prognosis.

EFFECTS OF TREATMENT BY WEIGHT REDUCTION

Treatment by weight reduction is often of the greatest value when obesity occurs either as an incidental association or as the result of some other condition, and perhaps unnoticed by the patient at all. Sometimes the actual increase in weight above the normal is comparatively slight and would pass unobserved in a healthy patient. In association with a weak myocardium or a raised blood pressure, however, it becomes profoundly significant, because it may be the one factor which is treatable, and may turn the scales in favour of recovery. Some conditions in which the possibilities of weight reduction should always be considered are: chronic bronchitis, myocardial weakness and degeneration, high blood pressure, viscerotaxis, and fascial rheumatism. In such the methods used are the same as those in simple obesity. Their application is, however, a much more delicate problem. Changes of diet and exercise must be made more slowly and must be carefully adjusted to the individual case. Before beginning treatment it is best to make a patient describe in detail his diet and daily life. This provides a basis which may be gradually modified on the lines mentioned. In cases of heart disease and high blood pressure it may be best in the early stages to use massage as a prelude to increased activity.

ILLUSTRATIVE CASES

The following are examples showing some types of case to which the above methods are applicable:—

Case 1.—A general practitioner, aged 47. The patient gave a history of chronic bronchitis with increasing winter cough for five years; breathlessness on exertion, getting worse for six weeks; and pain over the præcordium on exertion, with fluttering sensations in the chest. Examination in April, 1936, showed the presence of chronic bronchitis and some emphysema. Clinically his heart was found to be enlarged and one inch to the left; there were a tick-tack rhythm and frequent extrasystoles: the resting pulse rate was 90. There was slight cyanosis; the blood was 140/90, and the electrocardiogram normal. His weight was 13 st. 12 lb.; height 5 ft. 7 in. The diagnosis was chronic bronchitis and myocardial weakness. Treatment consisted in gradually reducing the diet and increasing exercise, reducing smoking, and ordering the wearing of an abdominal belt. On 20th May the patient was much better and his weight was reduced to 13 st. 5 lb. On 7th July there were no symptoms; his weight was then 12 st. 2 lb., and he was doing much of his practice on a bicycle. The improvement has since been maintained.

Case 2.—A mau, aged 62, complained on 31st July, 1937, of increasing breathlessness on exertion and slight giddiness of several months' duration. Examination revealed arterio-sclerosis, a blood pressure of 190/110, and a pulse rate of 46. An electrocardiogram showed a 3:1 heart-block. His weight was 14 st. 3 lb. After ten days' treatment with massage, mild graduated exercises, and reducing diet his weight had fallen to 13 st. 4 lb. The symptoms of breathlessness and giddiness had disappeared, and he felt much better.

Case 3.—A woman, aged 52, had had increasing noises in the head and breathlessness on exertion for eight months, with a recent gain in weight. Examination revealed arterio-sclerosis and a high blood pressure (200/110). Her weight on 17th July, 1937, was 12 st. 8 lb. Treatment consisted in reducing the diet and the prescription of half a grain of thyroid extract each day. After three months her weight had fallen to 10 st. 8 lb., the blood pressure was 200/94, the symptoms had disappeared, and she felt well.

Case 4.—This patient, a woman, aged 44, complained of pain in the back on exercise and a 'bearing-down feeling' in the stomach. On examination her doctor found sugar in the urine. When seen on 1st June, 1937, she was very obese, her weight being 16 st. 9 lb. There was a heavy deposit of fat round the shoulders and hips, and the abdomen was protuberant. The urine gave 2 per cent of sugar, but no acetone. The resting blood sugar was 2 per cent. Treatment took the form of massage and exercises to reduce weight and improve posture and breathing, with a reducing diet, and an abdominal belt was worn. After three months' treatment the symptoms had gone, the urine was sugar-free, the resting blood sugar 0.12 per cent, and the patient's weight 14 st. 6 lb.

Case 5.—A woman, aged 51, stated that following an attack of influenza in February 1937, she developed shortness of breath and precordial pain on exertion. These symptoms persisted. When examined on 19th May, 1937, her heart was not enlarged, but the quality of the sounds was poor; the blood pressure was 150/80. The abdominal wall was lax, with visceroptosis. Her weight was 10 st. 10 lb. and she was rather fat. Treatment was by means of an abdominal belt, massage, and exercises to reduce weight, and a moderate reducing diet. After five months' treatment her weight was 10 st. 1 lb. She was better in every way and her symptoms had almost gone.

CONCLUSION

By treatment on the above lines it is often possible to delay the effects of degenerative processes that occur after middle life. To be successful, however, such treatment must be begun early and must be thorough. If it is left too late comparatively little can be done. Both the recognition and the treatment are in the hands of the family doctor, whose opportunities are unrivalled.

The Treatment of Septicæmia

By LIONEL E. H. WHITBY, C.V.O., M.C., M.D., F.R.C.P.

(From the *Medical Press and Circular*, Vol. CCI, 17th May, 1939, p. 470)

SEPTICÆMIA is caused by the entry of bacteria into the blood stream. Here the organisms multiply and by reason of this multiplication exert a toxic action on the tissues of the body. In pyæmia there is septicæmia with a tendency for the circulating bacteria to aggregate and form infarcts which readily proceed to abscess formation. The primary lesion in pyæmia is usually an extensive focus of infection such as osteomyelitis. Septicæmia and pyæmia have to be distinguished from bacteriæmia in which condition bacteria are present in the blood stream, and do indeed multiply there so that they may be demonstrated by blood culture. The blood stream invasion, however, is only a preliminary phase of a more defined disease process. Examples are the bacteriæmia characteristic of the early stages of typhoid fever and sometimes

the invasive phase of lobar pneumonia. The treatment of septicæmia and pyæmia is to a large extent influenced by the primary cause as well as the nature of the infecting organism. As to cause, septicæmia is frequently cryptogenic and this perhaps the most fatal form of the disease, may appear quite suddenly in apparently healthy subjects or as a terminal condition in debilitated persons afflicted with such diseases as nephritis. In other cases the cause and the portal of entry are clear. In parturient women the large raw area of the placental site provides a ready portal of entry. In some, the injury caused by a dental extraction or by unwise surgical interference with a vascular, but not purulent, inflammatory lesion may cause infection of the blood stream; in others the inoculation may be accidental from a cut or prick. The organisms most commonly responsible are hamolytic streptococci of group A, occasionally groups B, C and G, and *Staphylococcus aureus*, but almost any organism may bring about the disease in debilitated subjects or in those who receive a large and virulent inoculation; in puerperal septicæmia anaerobic streptococci are sometimes responsible. The treatment of septicæmia and pyæmia *per se* should include: (1) General measures, (2) Chemotherapy, (3) Specific therapy, and (4) Surgical measures. The sooner treatment can be instituted the greater is the chance of success, and though an essential prelude to rational treatment is the establishment of the exact nature of the infecting organism by blood culture, empirical treatment, based on clinical probability, should be undertaken whilst investigations are being carried out.

(1) *General measures.*—The patient should be at complete rest in bed. Food should be as generous as the diminished appetite allows, whilst the fluid intake should be as high as possible. Fever should be controlled by tepid sponging and not with antipyretic drugs. Fresh air is essential; the sick room should be light and airy and, when practicable, nursing in the open air is to be recommended. Small blood transfusions, not exceeding 250 c.c., are beneficial and may be given every 5 to 7 days in chronic cases.

(2) *Chemotherapy.*—The discovery of the sulphanilamide group of drugs has greatly improved the prognosis in septicæmia. Dosage, route of administration and choice of compound vary with each individual case. As a general principle, a large initial dose of the appropriate compound is desirable in order quickly to obtain an adequate concentration of the drug in the blood. When facilities are available it is as well to check this point by a blood estimation a few hours after beginning treatment. The blood content should reach and be maintained at not less than 10 mgm. per cent. If this level is not reached with an oral preparation, then subcutaneous, intramuscular or intravenous injections should be used as a supplement. The oral preparations serve for most purposes and they have the advantage of being slowly and continuously absorbed over a period of time, thus maintaining an adequate blood level. Soluble preparations for injection or injection of sulphanilamide itself (which is soluble in water to the extent of 1 per cent) are more rapidly absorbed than oral preparations, but they are also excreted more rapidly. Numerous injections are therefore necessary if a soluble preparation is used as the sole method of treatment. Intravenous administration is rarely required; only Soluseptasine (*vide infra*) is at all well tolerated. The parenteral route has to be used when swallowing is not possible, when nausea and vomiting are prominent symptoms, when absorption from the alimentary canal is inadequate, and for immediate treatment in urgent and neglected cases.

The duration of treatment has to be decided for each individual case. Where these drugs are effective the result is usually obvious within a few days. If no action is noticed within ten days it is useless to pursue treatment with that particular drug. Prolonged courses tend to cause a fatal agranulocytosis and a number of other distressing and sometimes dangerous symptoms. If the first course of ten days is not entirely effective an interval of three days should be

allowed before beginning a fresh course. For the second course a change of preparation is often an advantage. When dangerous symptoms caused by the drug arise during the course of treatment the blood stream can be rapidly cleared by inducing diuresis with water.

Choice of preparation.—(a) *Oral.*—Sulphanilamide (sold also under trade names, which include Sulphonamide p, Streptocide, Colsulanyde, Prontosil album) is markedly active against most *B. hæmolytic* streptococci, meningococcus, gonococcus, *Bact. coli* and *Cl. welchii*, but is relatively inactive against staphylococcus and has no appreciable action on pneumococcus and *Streptococcus viridans*. The drug is well tolerated by the mouth and is probably the compound of choice for empirical treatment of a suspected hæmolytic streptococcal infection.

A total daily dose of 1 g. per 20 lb. of body-weight (maximum 5 g.) should be given, for the first two days, in equally divided doses administered four hourly. Children require a 50 per cent larger dose in proportion to body-weight than do adults. After two days the total daily dose should be reduced by a gram and after a further two days the remainder of the course of ten days should be at the rate of 3 g. per day.

The benzyl compound, 'Proseptasine', has approximately the same range of activity as sulphanilamide, but is less soluble, less toxic and less powerful. This compound is of great value for, and is more suitable for, the treatment of less serious diseases than septicæmia.

The pyridene compound 'M. & B. 693' has a wider range of activity than sulphanilamide, being effective against all the organisms influenced by the latter as well as against pneumococcus, whilst it is more effective against staphylococcus and *Streptococcus viridans*. The pyridene compound is therefore the best drug for empirical use when the nature of the infecting organism is uncertain from the clinical aspect. A dosage similar to that for sulphanilamide may be used. A certain number of cases have difficulty in taking the drug by the mouth; vomiting and nausea may prohibit adequate treatment. In all cases it is advisable to powder the tablets and suspend the powder in milk; in this form the drug is usually well tolerated. M. & B. 693 is not sufficiently soluble in water to be administered as a subcutaneous solution, but a suspension in olive oil may be given by this route. The sodium salt of M. & B. 693 is extremely soluble and effective; it is at present in the experimental stage of trial and is not available for general use.

(b) *Parenteral.*—'Prontosil soluble' (Bayer) is made as a 5 per cent solution. The total daily dosage for the first ten days should be 0.5 c.c. per 1 lb. of body-weight (maximum 60 c.c.); this should be divided in six doses administered during each 24 hours. 'Soluseptasine' (May and Baker) may be given in higher dosage (maximum 200 c.c.) and is the only preparation suitable for intravenous administration. Owing to the rapidity with which the soluble preparations are excreted it is necessary to make frequent injections in order to maintain the blood concentration at an efficient level. Hence, it is now usual to rely on soluble preparations only. The main uses of these compounds are to supplement an oral preparation, especially when there is much nausea and vomiting or if there is poor absorption as shown by a blood estimation; they are also useful at the beginning of the course of treatment.

(3) *Specific therapy.*—When appropriate sera are available they may be used to supplement chemotherapeutic treatment. There is considerable evidence that the sulphonamide group of drugs exert their action by inducing bacteriostasis and that the final elimination of the infection requires the co-operation of the immunity mechanisms of the host. For this reason, therefore, small doses of the concentrated antitoxic sera of streptococcus, staphylococcus and *Clostridium welchii* should be used when there is much toxæmia. Except in chronic low-grade infections with little or no

febrile and general reaction, vaccines are useless and even dangerous.

(4) *Surgical measures.*—Any abscess which develops in the course of the disease should be treated by drainage when fully mature. The formation of an abscess is sometimes a favourable event which serves to localize the infection. The production of an artificial fixation abscess by injection of 1 drachm of turpentine beneath the skin is favoured as a method of treatment by some authorities.

PROPHYLAXIS IN THE CASE OF WOUNDS

Most medical men must at some time have thought about what they would do were they to receive a wound when dealing with an obviously infected patient or when doing post-mortem. As the result of such an injury one of three things may happen. Firstly, the infecting organism may be inoculated direct into the blood stream, in which case, owing to the speed of the blood stream, no local measure, however quick, can prevent the dissemination. Secondly, the infecting organism may be inoculated into the tissue spaces and either give rise to a local abscess or cause an ascending lymphangitis, which, in due course, may result in septicæmia. Thirdly, nothing may happen, either because no inoculation is made or because the organism is quickly overcome. As an immediate measure there is much to be said for the encouragement of free bleeding by the application of a light tourniquet, the free-flowing blood being washed away under a tap. Caustics and strong antiseptics should be avoided as these cause tissue necrosis which encourages the growth of any implanted organisms; iodine or acriflavine may be used, but the best dressing, if such is available, is either hypertonic saline or hypertonic magnesium sulphate, which stimulate an outward flow of lymph. However busy a medical man may be he is taking an unnecessary risk if he does not cease work at once and go to bed for at least 24 hours with the affected part immobilized; he should, of course, remain in bed if there is the slightest evidence of local or general reaction at the end of this time. During the period in bed a prophylactic course of the appropriate sulphanilamide drug should be taken in full dose and this should be continued unless everything appears well at the end of 24 hours.

Reviews

DIET IN HEALTH AND DISEASE.—Edited by Sir H. Rolleston, Bt., G.C.V.O., K.C.B., M.D., F.R.C.P., and Alan A. Moncrieff, M.D., F.R.C.P. 1939. Published on behalf of the Practitioner (5, Bentinck Street, W.1) by Eyre and Spottiswoode (Publishers), Limited (6, Great New Street, E.C.4), London. Pp. 382. Price, 14s.

THIS is the fourth book in this practical series to be issued, and in many ways it is the most useful.

The first chapter, which is introductory, is an excellent one. It is written by Dr. V. H. Mottram whose work on dietetics is well known; he claims that the physiological approach to the subject of dietetics is more suitable than the chemical. Though he admits that the broad division into energy-producing, body-building and body-protecting substances is a vague one, he considers that it is much more easily understood and remembered than the more exact chemical classification of food substance into proteins, fats, carbohydrates, calcium, iron and other minerals, vitamins A to E with their numerous sub-division, etc.

The book is divided into chapters on diet in individual disease (e.g., pulmonary tuberculosis), groups of diseases (e.g., nervous and mental disorders), symptomatic states (e.g., constipation), and special physiological states (e.g., pregnancy).

The chapter on diet in tropical diseases is on the whole a good one. The author has had many years' experience in dieting patients suffering from tropical

diseases, in a temperate climate. In discussing diseases such as sprue, dysentery and kala-azar, he has given a good account of the best practice, but in other, chronic diseases, such as leprosy, he is obviously at a loss and has beaten round for isolated remarks by writers on these diseases, which, taken from their context, are not really very helpful. He has further confused matters by including certain diseases which are aetiologicaly associated with the eating of poisonous substances; this subject is outside the scope of the book, as well as being inaccurate in some cases.

Professor Cathcart in his introduction mentions the young hospital-trained general practitioner, who orders a 'light diet' for his patient and sincerely hopes that he will get past the door before he is questioned further on the subject. Now at least he will be able to look it up when he gets home, in case, after a successful escape on his part, the patients' relatives should telephone for the information.

It is a very valuable addition to the practitioners' reference library. Its use in this country will naturally be limited, but as the principles as well as the practice are there, a little adaptation only will be necessary.

SILICOSIS AND ASBESTOSIS.—By Various Authors. Edited by A. J. Lanza, M.D. 1938. Oxford University Press, London. Pp. xxvi plus 439. Illustrated. Price, 25s. Obtainable from Oxford University Press, Bombay and Calcutta

THE death and morbidity rates are much lower in the advanced industrialized countries of the west than in India, but the credit is not all on one side, and against the better housing and better food of the industrial worker is the direct result of the industry itself on his health.

We have scarcely begun to study this aspect of industrial advance in India, but we shall have to do so, and it is fortunate for us that much ground work has been done in Great Britain and in America, and also in South Africa where conditions are closer to those in this country.

This monograph on pneumoconiosis, or pneumoconiosis as they prefer to call it in this book, is a valuable summary of our present knowledge on this subject, written by six experienced workers in this field: four are American and two British.

There is a good historical summary. The subject is dealt with on a geographical basis; the seven countries mentioned are Great Britain and her three largest colonies, Germany, Italy, and the United States. The subsequent chapters are on aetiology and symptomatology, x-ray diagnosis (the writer shows a tendency to wander from his subject, e.g., he includes a paragraph on the sedimentation rate), pathology, experimental pathology, the occupational, preventive and legislative aspects in Great Britain (by Dr. E. L. Middleton, H. M. Medical Inspector of Factories), and the public health and economic aspects in the United States.

The subject is clearly and concisely presented by the various writers, and the book is well illustrated. It is a book that is essential for the sanitarian, and especially the industrial hygienist, in this country, and every medical officer who works amongst miners should certainly obtain a copy.

THE TREATMENT OF RHEUMATISM IN GENERAL PRACTICE.—By W. S. C. Copeman, M.A., M.D., B.Ch. (Cantab.), F.R.C.P. (Lond.). Third Edition. 1939. Edward Arnold and Company, London. Pp. viii plus 276. Price, 10s. 6d.

THIS is the third edition of a book that has already earned a reputation as a sound guide for the general practitioner in dealing with rheumatism and allied conditions.

The author claims that his book is the first of its kind, that is, a book by a general physician in which the whole subject of rheumatism is treated impartially. No one form of treatment is emphasized, as is the case in so many books on the subject; this enthusiast advocates vaccines, that hydrotherapy, another light,

and yet another diathermy; then there are the searchers for septic foci, the bowel washers, the chemotherapists, and dietitians. Dr. Copeman weighs them all up and if the mixture is more like weak tea than strong wine, it is precisely for this reason that it is better for reader's patients.

This new edition has been largely rewritten and brought thoroughly up to date and we can very strongly recommend it to the general practitioner in this country.

RHEUMATISM.—By B. S. Nissé, M.D. (Lond.), M.R.C.P. (Eng.). 1938. John Bale Medical Publications, Limited (85, Great Titchfield Street, W.1), London. Pp. 168. Price, 5s.

THE author, who is one of the honorary physicians to that excellent institution the British Red Cross Clinic for Rheumatism, Peto Place, has written a concise, readable and practically useful book on rheumatism, in its widest sense. The book is divided into three parts; these are on rheumatic fever, that is, acute and sub-acute rheumatism, fibrositis, and arthritis, respectively.

The treatment advocated for each condition is in conformity with modern views on the subject, and the author has no particular specialization which he emphasizes at the expense of other forms of treatment.

The book is published in a very attractive form, with an artistically very satisfactory page. It is bound in unvarnished cloth which provides no temptations to fauna of the Indian desk and open bookshelf.

PRINCIPLES OF DIAGNOSIS, PROGNOSIS AND TREATMENT: A TRILOGY.—By R. Hutchison, M.D., LL.D., F.R.C.P. Second Edition. John Wright and Sons, Limited, Bristol. Pp. 53. Price, 3s. 6d.

THIS now almost classical essay has been reprinted and published in a very attractive form.

It is a small book that could be read in an hour, but every word is worth remembering and acting upon.

The volume would make a very suitable gift for a medical man.

THE COMPLETE PEDIATRICIAN PRACTICAL, DIAGNOSTIC, THERAPEUTIC AND PREVENTIVE PEDIATRICS. FOR THE USE OF MEDICAL STUDENTS, INTERNES, GENERAL PRACTITIONERS AND PEDIATRICIANS.—By W. C. Davison, M.A., D.Sc., M.D. Second Edition—Completely rewritten. 1938. The Duke University Press, Durham, N.C. Pp. vi plus 250. Price, \$3.75.

THIS book might equally well have been called 'potted paediatrics'. It is a really American production, with its characteristic efficiency and its equally characteristic limitations. For quick reference it would be hard to beat, and the information is on the whole accurate, but it is perhaps 'potting' a little too much to say that 'as the symptoms of kala-azar and sleeping sickness are the same as those of malaria, the diseases will be described together'. However, a surprising amount of useful information has been crowded into the two columns of each page. It takes a little time to get used to finding diseases: it is not, for example, immediately clear why one should look under the gastro-intestinal group for yellow fever, under skin conditions and contagious diseases for tick typhus, and under circulatory, metabolic and glandular diseases for malaria. But there is a good index and one learns.

The author doesn't hold with the niceties of Latin grammar and prefers the forms *Stegomyia fasciatus* and *Aedes aegyptus* to the more usual ones.

This is a second edition and we quite agree that the changes are improvements: also the subject-matter has been brought completely up to date. The format is an attractive one. It is a book we can recommend to those to whom it is dedicated—medical students, internes, general practitioners, and paediatricians.

CLINICAL DIAGNOSIS BY LABORATORY METHODS: A WORKING MANUAL OF CLINICAL PATHOLOGY.—By J. C. Todd, Ph.B., M.D., and A. H. Sanford, A.M., M.D. Ninth Edition. 1939. W. B. Saunders Company, Philadelphia and London. Pp. 841, with 368 illustrations, 29 in colours. Price, 27s. 6d.

THIS is the ninth edition of a book that is already well known amongst laboratory workers in this country. It forms a comprehensive guide to the diagnostic laboratory worker and is a useful book of reference for the research worker. The methods that are described include those relating to the sputum, the urine, the blood, both cytological and chemical, the gastric contents, the faeces, pus, and puncture fluids. There are chapters on animal parasites, serodiagnostic and bacteriological methods, vaccines and skin tests.

It is four years since the last edition was published and considerable revision has been carried out. A number of new methods have been added and obsolete ones dropped out. A new classification of the anæmias is given. As the authors say 'many classifications... are proposed but none of them are (sic) entirely satisfactory'; we agree, but we don't think Ottenberg's, the one they give, is the best.

It is a useful book which we can conscientiously recommend to both laboratory workers and physicians.

THE ESSENTIALS OF PHARMACOLOGY, MATERIA MEDICA AND THERAPEUTICS FOR MEDICAL STUDENTS.—By D. M. Macdonald, M.D., F.R.C.P.E. 1938. Henry Kimpton, London. Pp. 279. Price, 7s. 6d.

THE essential idea which suggested an addition to an already large number of textbooks is to impress on the student the wisdom of a wider and more practical knowledge of pharmacy and materia medica, in order to cultivate intelligent prescribing on the one hand, and to avoid slavery to proprietary preparations and stereotyped formulæ on the other.

For this reason, stress is laid on the importance of suitable and pharmacological combination with avoidance of incompatibility. In addition to a chapter on the latter, incompatibilities are indicated under their respective headings.

There is also introduced a series of prescribing notes suggesting the most appropriate or, it may be, palatable presentation of some particular drugs. The substance of the *B.P. Addendum* of January 1937 has been incorporated.

This is a handy little volume that practitioners in India will find useful.

CHEAP BALANCED DIETS (FOR BENGALLEES).—By Nishikanta Ray, B.A. 1939. Published by the University of Calcutta, Senate House, Calcutta. Pp. xii plus 125

THIS small book (which is the Calcutta University Jubilee Research Prize thesis) deals with the nutritional aspects of various articles of Bengali dietary and planning of cheap balanced diets suitable for Bengalees.

The book is divided into four chapters. Chapter I deals with dietary constituents and their contribution to nutrition; chapter II discusses the quantitative food requirements; chapter III summarizes the dietary value of the principal foodstuffs, and chapter IV is devoted to the planning of cheap balanced dietaries to satisfy the physiological needs of the individual at different ages, and, in the case of women, during pregnancy and lactation. The author has shown that a well-balanced diet for an average Bengalee adult can be devised at costs varying from Rs. 4-12 to Rs. 5-12 per month in Calcutta and at a cheaper rate in the smaller towns and villages.

The book will prove useful to those interested in nutritional problems in India. The general public would derive a good idea of the principles of dietetics 'so that the money available for food will be properly spent so as to get the largest return in food value and

progressive changes in the traditional dietary habits will be brought about'.

P. C. S. G.

A TEXTBOOK OF MALARIA CONTROL.—By V. Venkat Rao, M.R.San.I. (Lond.), and V. Ramakrishna, B.Sc. (Hons.), A.R.San.I. 1939. Published by V. Venkat Rao, Senior Malaria Inspector, B. N. Railway, Waltair, R.S. Pp. x plus 149. Price, Re. 1

THE book has undoubted value, but it has many misprints, and mis-statements that require detailed discussion which the space allotted to this review would not allow.

URINE EXAMINATION AND CLINICAL INTERPRETATION.—By C. E. Dukes, M.Sc. (Lond.), M.D. (Edin.), D.P.H. (Lond.). 1939. Oxford University Press, London and New York. Pp. xv plus 403. Illustrated. Price, 25s. Obtainable from Oxford University Press, Bombay and Calcutta

Of human excretions urine has always exerted the most popular appeal. A large percentage of the classical portraits of physicians, some of which are reproduced in this book, show their subjects holding a flask of urine up to the light, and the loquacious patient has usually a great deal to say about his or her urine and unhesitatingly expresses approval or disapproval of it on the strength of its appearance and smell. The reviewer has always been as sceptical about that wise look on the physician's face, as he is of his patient's assurance that his urine is 'quite alright'. There is remarkable little to be learnt from the macroscopic appearance of urine, compared with the information that can be obtained from its chemical, microscopic, and biological examinations, which form the subject-matter of this book.

This book is a concise yet comprehensive study of the subject. Often more than one method is described but the author has not attempted to include all known methods and has confined himself to the more practical ones. Recent works on hormones and vitamins are taken into consideration, and there is one of the best descriptions of the Aschheim-Zondek and Friedman tests that we have yet seen. These two tests are illustrated by a number of plates which show the results of the tests in the way that no words can do. Some of the methods of estimating the excretion of vitamins in the urine are given but one would scarcely rely on a book of this kind for the latest information on this kaleidoscopic subject. Under the heading of B₁ estimation the author has described a method of estimating porphyrin in the urine without any cross reference to a modification of this test which he described earlier in the book.

The author has earned the reviewer's special gratitude by avoiding that horrible word 'urinalysis'.

The book is an important addition to the library of the laboratory worker and physician. It is a book that one would recommend the senior student to purchase; he will find it invaluable to him in his house appointment and later when goes into practice.

AN INTRODUCTION TO HUMAN ANATOMY.—By Clyde Marshall, M.D. Second Edition. 1939. W. B. Saunders Company, Limited, Philadelphia and London. Pp. 388. Illustrated. Price, 12s.

THIS should be a good book for use in teaching higher school classes and junior science students the main facts of human anatomy including microscopic anatomy or histology. It is not recommended for the medical student, however, because with the limited time available in the average medical course it is necessary for him to plunge direct into a detailed study of the subject without spending any time on acquiring a smattering of the whole subject as a preliminary to deeper study, and this is all this book can supply.

It is copiously illustrated with figures taken from all the best-known anatomy and histology textbooks, the only two figures noticed without any acknowledgment being nos. 40 and 42.

On the whole it is clearly written but on page 330 the following confusing misprint occurs. 'Normally the maxillary process and the frontonasal process fuse completely and leave no trace of their former existence as separate parts. Occasionally, however, the fusion is incomplete and an opening between the *left is left*' (reviewer's italics).

The complete 'Americanization' of the spelling of ordinary words is an objection to use of the book in countries where English spelling is employed.

A SYNOPSIS OF SURGICAL ANATOMY.—By A. L. McGregor, M.Ch. (Edin.), F.R.C.S. (Eng.). Fourth Edition. 1939. John Wright and Sons Limited, Bristol. Pp. xii plus 664. Illustrated with 648 figures. Price, 17s. 6d.

As Sir Harold Stiles said in the foreword to the first edition of this book, with the advances in anaesthesia and the reduction of the importance of the time element, the field of the surgeon is so vast that a surgical anatomy has to cover the whole human frame. Therefore, a synopsis of anatomy in which the surgical point of view is maintained is really the only way to meet the requirements of the under-graduate student, or the doctor studying for higher surgical qualifications.

If this was true in 1932 it is truer to-day. This book has reached its fourth edition; the third was issued in 1936 and was reprinted in 1937. No important changes have been made but there has been a general revision.

The descriptions are clear and concise and there are useful line drawings almost on every page. It is published in a practical and attractive format. It is a book that will prove invaluable to the student and to the surgeon in this country.

A SYNOPSIS OF REGIONAL ANATOMY.—By T. B. Johnston, M.D. Fourth Edition. 1939. J. and A. Churchill Limited, London. Pp. xxi plus 462. Illustrated. Price, 12s. 6d.

THIS is the fourth edition of a book with an already established reputation, so little need be said about it.

It is a synopsis and is therefore meant for use only for revision. The point is emphasized in the preface; by revision the author means *revision*, and in order to make quite sure that the reader has a clear mental picture of the part, which he should have acquired during his dissection work, the author gives no illustrations. Where this picture is not clear enough to be assisted by this book, the student must go back to the dissecting room. He has made an exception with reference to the central nervous system, for obvious reasons, and has given some good diagrams, a number of which are new to this edition.

Reviews of previous editions of this book have been consistently laudatory. No drastic change has been made in the present edition, but the whole text has been revised and some additions have been made.

It is a book that will be very useful to the student in this country.

CLINICAL PATHOLOGICAL GYNÆCOLOGY.—By J. Thornwell-Witherspoon, B.S. (Princeton), B.A. and M.A. (Oxon.), M.D. (Johns Hopkins). 1939. Henry Kimpton, London. Pp. 400. Illustrated with 271 engravings. Price, 30s.

As the author points out in his preface, this work is not a complete gynæcological textbook. It does, however, take the reader over the main field of gynæcological pathology in a manner which is at once concise, clear, and easy to follow. In rather less than four hundred pages of interesting reading, augmented by excellent drawings, photographs, and photomicrographs, the author has described all the usual pathological conditions peculiar to women, including modern ideas on hormonology.

In general, clinical signs and symptoms are omitted intentionally, and only some elements of treatment are

given. Lists of references to modern authorities are included under their appropriate sections.

The book is arranged on an anatomical basis, and a section describes some of the disorders of early pregnancy, *i.e.*, abortions, ectopic pregnancy, hydatidiform mole, and chorion epithelioma.

A chapter is devoted to an interesting and instructive discussion on the relationship between estrogenesis and carcinogenesis.

The printing and general arrangements are good, and the price reasonable.

Those interested in gynæcology will appreciate this book as a readable and reliable work on the pathology of this speciality.

K. S. F.

HUMAN PATHOLOGY: A TEXTBOOK.—By H. T. Karsner, M.D. Fifth Edition. 1938. J. B. Lippincott Company, Philadelphia and London. Pp. xii plus 1013, with 18 illustrations in colour and 443 black and white. Price, 45s. Obtainable from Messrs. Butterworth and Company (India), Limited, Calcutta. Price, Rs. 33-12

KARSNER'S Pathology is well known to every student of medicine. Within a short period of about twelve years five editions have come out which only speak for the immense popularity of this book. The edition has been profusely illustrated and exhaustive references have been added at the end of each section which are very helpful to the readers who want to learn more about the subject. In dealing with the subject-matter under each section the author has avoided the practice of presenting a cut-and-dried view of any subject, but has very wisely introduced different view points by various workers, so that students can get a comprehensive idea of the subject. The inclusion of recent work has made the edition up-to-date. A helpful procedure has been offered to the readers in the way of affixing a very brief summary at the beginning of each chapter which will enable readers to see the contents at a glance.

The author has first described the general pathological processes and thereafter has given his attention to the special pathology of each section under systematic heads, which will enable the students to follow easily the application of the general pathological changes to a particular system as modified by its anatomical and physiological considerations.

Under the heading of disturbances of circulation, the subject of infarction has been dealt with before thrombosis and embolism; if the arrangement had been reversed it would have been easier for the student to grasp the subject. Some of the subjects which do not come under the purview of pathology in its strictest sense have been described in full, *viz.*, the biology, morphology and chemical composition of *M. tuberculosis* and the interpretation of the Wassermann reaction, whereas the author has very shortly dealt with some of the sections, *e.g.*, the pathology of tumours of the adrenals and muscle tissue. While describing the kala-azar spleen the author states that the parenchymatous cells of the liver might contain parasites (p. 521) which, however, requires modification. In our experience at least, the parasites were never found within the liver cells.

Apart from these minor defects the author should be congratulated for the excellent mode of presentation of the subject and the general get-up of the book.

B. P. T.

BERGEY'S MANUAL OF DETERMINATIVE BACTERIOLOGY: A KEY FOR THE IDENTIFICATION OF ORGANISMS OF THE CLASS SCHIZOMYCETES.—By David H. Bergey, Robert S. Breed, E. G. D. Murray and A. Parker Hitchens. Fifth Edition. 1939. Baillière, Tindall and Cox, London. Pp. xi plus 1032. Price, 45s.

THIS is a book which is indispensable to all serious students of bacteriology and is constantly required in bacteriological laboratories. Bacteriologists owe a debt of gratitude to the late Professor Bergey for having undertaken the preparation of the Manual. It is

interesting to recall that the first edition of the Manual which was published in 1923 tabulated descriptions of 832 species of bacteria with reference to the original place of publication of 1,577 descriptions; the present edition contains description of 1,335 species with a reference to the original place of publication of 5,600 descriptions. The size of the Manual is now more than double that of the first edition. There are many additions in this edition as compared with the fourth edition. The number of families in the order of Eubacteriales has been increased from the three found in the previous editions to twelve. Nine new generic names are used. This new edition will be welcomed as a most useful book of reference by all bacteriologists.

C. L. P.

(a) **STUDIES ON THE HEALING OF FRACTURES—WITH SPECIAL REFERENCE TO THE SIGNIFICANCE OF THE VITAMIN CONTENT OF THE DIET.**—By John Hertz, M.D. 1936. Published by the Oxford University Press, Humphrey Milford, London. Pp. 286. Illustrated. Price, 15s. Obtainable from the Oxford University Press, Bombay and Calcutta

(b) **EFFECT OF CHRONIC VITAMIN-E DEFICIENCY ON THE NERVOUS SYSTEM AND THE SKELETAL MUSCULATURE IN ADULT RATS: A NEUROTROPIC FACTOR IN WHEAT GERM OIL.**—By L. Einarson, M.D., and A. Ringsted, M.D. 1938. Oxford University Press, London. Humphrey Milford. Pp. 163. Illustrated. Price, 12s. 6d. Obtainable from Oxford University Press, Bombay and Calcutta

(a) This is a beautifully produced monograph on a very important subject which all dietitians should have in their libraries.

Vitamin-C deficiency interferes very seriously with the healing of fractures, and the mechanism of this interference is shown in this monograph. Vitamin A does also, but to a less extent, and the detrimental effect of either hypo- or hypervitaminosis-D is considerable.

(b) This is another report on dietetic research in the State Vitamin Laboratory, Copenhagen. It presents important conclusions on the parts played by different vitamins in normal physiology. One important conclusion is that vitamin A has little or no neurotropic action, and that vitamin E, the 'neurotropic factor of wheat germ oil', is more important in this connection than vitamin B₁, or any component of the vitamin-B complex.

Both monographs are irreproachably translated by Dr. Hans Anderson.

HANDBOOK OF BACTERIOLOGY: FOR STUDENTS AND PRACTITIONERS OF MEDICINE.—By J. W. Bigger, M.D., Sc.D. (Dub.), F.R.C.P.I., M.R.C.P. (Lond.), D.P.H., M.R.I.A. Fifth Edition. 1939. Baillière, Tindall and Cox, London. Pp. xvi plus 466. Illustrated. Price, 12s. 6d.

THE fact that Bigger's bacteriology which was first published in 1925 has gone through five editions and that three of the editions have been reprinted demonstrates its popularity. This popularity is well deserved. Amongst the smaller textbooks on the subject Bigger's bacteriology can be confidently recommended as one of the best suited to the needs of medical students and the busy medical practitioner who desires to consult a book on bacteriology. The subject-matter is presented in a simple, concise but lucid manner. This is one of those books which a teacher of the subject can confidently recommend to his students. In the present edition definite advances in bacteriology have been incorporated, and, by judicious pruning and condensation, the present edition is only twelve pages more than its predecessor. Amongst the changes that we welcome is the introduction of the newer nomenclature based on what might be called the English modification of Bergey's nomenclature adopted by Topley and Wilson.

C. L. P.

THE STREPTOCOCCAL TENDENCY.—By J. D. Hindley-Smith, M.A., B.Ch. (Cantab.), M.R.C.S., L.R.C.P. 1939. H. K. Lewis and Company, Limited, London. Pp. iv plus 32. Illustrated. Price, 1s.

THE streptococcus in one or another of its forms has been repeatedly implicated directly or indirectly in many disease conditions. The disease-producing capabilities of certain members of the genus *Streptococcus* are bewildering, from simple sore throats to fatal septicæmia. The streptococcus must be considered to be the bacterial enemy no. 1 of man. Careful study has been made of these organisms and there exists an extensive literature on streptococci.

The reviewer had hoped to find something of interest in this 32 paged booklet with its quaint title, but in this he was sorely disappointed. The author after drawing attention on page 1 to the long list of diseases caused by the streptococcus sets out six questions on page 2 which he answers in page 3. The rest of the book is devoted to vaccine therapy with a few remarks on the importance of the blood sedimentation test, non-specific therapy and a small paragraph on 'amino-benzo-sulphonamide'. It would not be worth while to review here the numerous statements in this little booklet which are not supported by any experimental work and many of which cannot be either proved or disproved. The whole work is an ill-fitting mosaic of facts, half truths and many conjectures. The four photographs which illustrate this book have no intrinsic value. The legends under illustration A and B are self-contradictory. The author has seen fit to extol the value of vaccine therapy in streptococcal prophylaxis without any convincing data. It is pity, for such statements must retard progress in the search for prophylactic agents.

C. L. P.

THE ANÆROBIC BACTERIA AND THEIR ACTIVITIES IN NATURE AND DISEASE, A SUBJECT BIBLIOGRAPHY (IN TWO VOLUMES).—By Elizabeth McCoy and L. S. McClung. 1939. University of California Press, Berkeley. Cambridge University Press, London. Vol. I, Chronological Author index, pp. xxiii plus 295; Vol. II, Subject Index, pp. xi plus 602. Price, 50s.

THESE two volumes contain a classified index of 10,500 articles, monographs or other reports on anærobic bacteria published up to 1937 and some published in 1938. There are approximately 120,000 entries and the two volumes represent five years' work. In the first volume is a chronological list of all references arranged alphabetically within each year. In the second volume are the subject index sections. Full instructions for the use of these two volumes are given in volume I and with their help references to papers on any particular aspect in the study of anærobic bacteria can be obtained. The authors are to be congratulated in bringing together in these two volumes information which would be difficult to obtain readily. This work would be of immense value to all interested in anærobic organisms.

C. L. P.

EPIDEMIOLOGY IN COUNTRY PRACTICE.—By W. N. Pickles, M.D. (Lond.). 1939. John Wright and Sons, Limited, Bristol. Pp. viii plus 110. Illustrated. Price, 7s. 6d.

THIS is a book that should be read widely in India. It is the simple story of an English country practitioner's observations on the epidemiology of infectious diseases, as he has observed them in his practice. The unkind critic might say of it 'It is a book that would have been important had it been written one hundred and fifty years ago, but now it only tells us what we all know'. That is not true. If the book is read in the right spirit it conveys an important message and it reminds us that epidemiology in its beginnings was not a mass of tables, statistics, and formulæ as it appears to be to-day; it was the careful summation of experience relative to the spreading of disease.

This book will we hope inspire the young country practitioner to go and do likewise. Let him record carefully every incident connected with the transmission of disease from one person to another. Most of what he writes will be valueless, but from it he may one day be able to correlate a number of observations, individually meaningless, which will throw a ray of light where darkness ruled before. But he must not expect to do this under, say, twenty-five years.

MEDICAL INFORMATION FOR SOCIAL WORKERS.

—Edited by W. M. Champlin, A.B., M.D. 1938. Baillière, Tindall and Cox, London. Pp. xi plus 529. Illustrated. Price, 18s.

THE thirty chapters and two appendices in the book have been contributed by nine teachers at the Western Reserve University, U. S. A. The book is primarily intended 'to enlighten the beginners in social work to enrich the medical knowledge at the command of the more mature social workers'.

Illness and social relations may be closely inter-related, for an illness may bring about a social or economic maladjustment, or a social and economic maladjustment may bring about illness. The maintenance of individual and community health is the responsibility, not only of the medical profession, but also of the lay public. Parents, teachers, nurses, health visitors and social workers have their own contributions to make and responsibilities to assume in maintaining and improving individual and community health. The better they are equipped with knowledge, the more efficient will be the service that they can render. The social worker, when he or she is properly supplied with medical information, can render practical assistance in promoting the cure and prevention of disease, *e.g.*, as regards assistance to the patient; assistance to the doctor, hospital or health agency; and contributions towards educational movements and legislation in the interests of public health. Even in treatment of diseases, one has often to adjust the physical conditions of the environment to the needs of the patient.

In catering for the above adjustments, the authors have been singularly successful. The various subjects and diseases with social implications have been dealt with briefly but lucidly. The initial chapters deal with cardiovascular diseases, rheumatic fever, diseases of the respiratory system, allergic diseases, syphilis, tuberculosis, etc. The pediatric section, including feeding and nutrition, has been placed next. Surgery of conditions with a medico-social significance has also been dealt with. The more specialized fields of gynaecology, orthopaedics, obstetrics and the like follow next. A useful bibliography, exercises in anatomy and physiology, and an index conclude the book.

With the growth of organized social service, the book is likely to be useful to all workers who desire to render or organize more intensive and better service for the community. The printing, paper, illustrations and the arrangement of materials are good.

A. C. U.

CLASSIFIED AND ANNOTATED BIBLIOGRAPHY OF SIR WILLIAM OSLER'S PUBLICATIONS. (BASED ON THE CHRONOLOGICAL BIBLIOGRAPHY BY MINNIE WRIGHT BLOGG.)—Edited by M. E. Abbott, B.A., M.D., LL.D. (McGill). Second Edition. 1939. The Medical Museum, McGill University, Montreal, Canada. Pp. xiii plus 163. Price, \$2.25

SIR WILLIAM OSLER was not only a great physician, but a deep thinker and a writer with great powers of expression. His writings covered a period of exactly fifty years, but his books will be read and his influence felt for many centuries.

This bibliography gives one some idea of the untiring activity of his very full life. It is an essential addition to the library of anyone who has made a study of Osler's writings.

THE GENUINE WORKS OF HIPPOCRATES. TRANSLATED FROM THE GREEK.—By F. Adams, LL.D. 1939. Baillière, Tindall and Cox, London. Pp. viii plus 384. Price, 13s. 6d.

No ancient writer is referred to more frequently than Hippocrates. This is not difficult to understand. It is not so much that we overlook what seem to us as naïvetés and puerilities for the sake of his flashes of intuition, but that his whole outlook is so very much the same as ours, or to put it more fairly, after wandering about in the dark for over two thousand years we have come back to his point of view. Take for example the Hippocratic oath; one cannot criticize a single sentence in it. Then again, his method of presenting a case is almost exactly the method that the student of to-day is taught: he gives the age, the history, and the habits of the patient, he describes the onset, and then gives the outstanding events day by day. When he comes to the cause of death, or recovery, his remarks are reminiscent of the average death certificate of to-day; from an ætiological point of view, it is not illuminating to attribute death to 'profuse sweating' and 'convulsions'. Though he does sometimes go a little further back to find the cause of the trouble, as for example in the case of the young man who died of what might have been severe bacillary dysentery; his death is attributed to 'unreasonable practices' which consisted in 'fatigue, labour, and running out of season'. This is probably about as near to the truth—if we know it to-day—as anyone would have got, up to about 50 years ago.

These selections from the writings of Hippocrates were translated by Francis Adams, a Scottish surgeon, about a hundred years ago at the instance of the Sydenham Society. They were published in 1849 with profuse notes: the latter have been omitted in order to present 'a continuous and connected picture of medicine in the Golden Age of Greece'. This much has been gained, but the wonderful opportunity of a three-point comparison has been lost by the omission of these notes.

A volume of the works of Hippocrates should be in the library of every thinking physician and surgeon, and this edition is a very pleasing one.

AIDS TO FEVER NURSING.—By J. M. Watson, S.R.N., S.R.F.N., D.N. (Lond.). 1939. Baillière, Tindall and Cox, London. Pp. xii plus 284. Illustrated. Price, 3s. 6d.

THIS book dealing with fever nursing is one of a series of handbooks that are being published to cover all the subjects included in the examination syllabus of the general nursing council.

The author has succeeded in presenting the outline of the whole field of modern fever nursing in this small volume. The sections are well written and contain in detail the practical nursing procedures required in the modern treatment of the various infectious diseases.

The book will prove useful to those for whom it is meant.

OTHER BOOKS RECEIVED

Practical Rejuvenation or How to Keep up Health and Vigour during Advancing Age. By Dr. K. V. Mathew. Second Edition. 1939. Published by Mrs. Anie Mathew, Kottayam, Travancore. Pp. 200. Illustrated.

J. F. Sutherland's First Aid to Injured and Sick. Edited by H. Sutherland, M.D. Forty-first Edition. E. and S. Livingstone, Edinburgh. Pp. 70. With 46 diagrams, one coloured. Price, 6d. Postage, 1d.

The Future of Medicine. By Baidya Nath Charan Roy, M.B. 1939. Printed by The Eagle Lithographing Company, Limited, 26, Christopher Road, Calcutta. Pp. 18. Available from Bnc.R. Clinic, 7, Loudon Street, Calcutta (India).

The Human Eye. By K. S. Malkani, Oph.D. Second Edition. 1939. Published by the author (K. S. Malkani, Oph.D., Ophthalmic Surgeon, Camp, Hyderabad, Sind). Pp. 62. Illustrated.

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Incidence of chief diseases.—The statement below shows the ratios per 1,000 of population under the chief heads of mortality in 1937:—

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Dysentery and diarrhoea	3.1	2.5	2.5
Respiratory diseases ..	1.7	0.7	0.7
Injuries	0.4	0.4	0.4
All other causes	8.0	8.8	8.8

The death rate increased from 27.8 in 1936 to 28.6 per mille of population in 1937. The increase in the number of deaths was chiefly due to large number of deaths from fever under which the death rate of 15.2 was reported as against 14.0 in the preceding year.

The highest death rate 15.2 was recorded from fevers but in the absence of any arrangements to report correct diagnosis it is not possible to say what percentage of deaths under fevers is definitely due to malaria.

The urban death rates from cholera, smallpox and fevers were lower than those of the rural areas. This is ascribed to better standard of sanitation in the municipal towns but the mortality rate from dysentery and diarrhoea and respiratory diseases still remains higher in the urban areas. The high mortality rate from dysentery and diarrhoea in the urban areas of this province is mainly due to the bad state of water-supply.

No case of plague was reported in this province during the year under report. Particular care was, however, taken to prevent this infection getting through the port of Gopalpur into this province through immigrants returning from plague-infected ports, such as Rangoon.

Maternity and child-welfare.—As the new province of Orissa could not form a maternity and child-welfare society of its own the Bihar maternity and child-welfare society continued to work through its managing committee in so far as the North Orissa districts were concerned. No share of the invested capital of the Bihar and Orissa society was received by Orissa as it was held that the invested capital of Rs. 20,000 was made up only of donations from Bihar. The local centres in Orissa are financed from the annual grant made by the Provincial Government and by contributions made by the local bodies and donations collected locally.

There were five maternity and child-welfare centres, *viz.*, one at Cuttack, one in Balasore, one in Sambalpur and two in Ganjam district, at Berhampur and Parlakimedi. Each centre is managed by a local committee.

School hygiene and medical inspection of school children.—There is one school medical officer of the Provincial Public Health Service, with the necessary public health qualification and one assistant school medical officer of sub-assistant surgeon class for this province. These officers inspect all the high English schools and most of the middle English schools of the province. The boys in the middle English and the middle vernacular schools in the rural areas are

examined by the district board health staff and district board dispensary doctors. No examination of school children in primary schools is done as the number of such schools is too large for the existing Government or district board staff.

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As in the past, the majority of so-called 'new admissions' during 1936 were old chronic mental patients with marked debility and other physical ailments who were kept at home for years, and were sent for treatment when they became unmanageable at home and proved dangerous to themselves and others. The recovery and the improved rates during the year under report should be considered extremely satisfactory considering the above state of affairs.

More than 50 per cent of the deaths occurred amongst old chronic demented who had been in the hospital for 20 years or more. Eight deaths that took place within a year of their admission were amongst those patients who were admitted in the hospital during the year under review with marked physical ailments.

Health of patients.—The general health of patients was good throughout the year under report and there were no outbreaks of an epidemic nature.

The following were the main types of physical disorders treated in the infirmaries during the year under report:—

Amoebic and bacillary dysentery, malaria, diseases of the connective tissues, skin diseases, debility, injuries, diseases of the digestive system, influenza, tuberculosis of the lungs, diseases of the respiratory system, ulcers and inflammations, primary and secondary anaemia, worms, specially ankylostoma and round worms.

I am glad to be able to record that the Government were pleased during the year under report to sanction my scheme (as stated in the previous year's report) for the conversion of one of the existing spare occupational therapy buildings in the female section at a nominal cost into a children's ward which will accommodate certified defective children. It is hoped that the work will now be completed without any further delay.

MENTAL DEFECTIVES OF INDIA

It will be presumably permissible to mention here that there exists no state or social controls for the mental defectives in India. No reliable statistics are available as to the number of such defectives in India but if such figures were obtainable they would indeed be very large. In this complex system of social relations what place can be found for the subnormal individual, who starts life, not only with a poor mental endowment, but with temperamental difficulties he can neither understand nor control?

He must be protected from dangers and others must be safeguarded from the results of his social conduct. While every civilized country has made and is making efforts to provide schools and institutions for some at least of its defectives, almost nothing has been done in India for its unfortunate defectives. India's defectives are at large and are allowed to do what they like and in absence of proper segregation and control by the State they thus perpetuate the mental defective race in India. The problem, I admit, is very vast, and would appear to be unsurmountable from the financial point of view, but, as India is now making all efforts at onward march of civilization it should also make a start in this direction, no matter how humble and ineffective it might appear. The Report of the British Royal Commission on feeble-mindedness of England states that 40 per cent of the juvenile offenders were feeble-minded and 20 per cent of the prison population of England were feeble-minded. If we were to make

a similar investigation of our jails in India our figure would probably treble that of England.

Since the true indictment of mental deficiency as a social evil of tremendous proportions has been found by Commissions appointed by civilized countries like England, America and Germany, we in India should take advantage of their findings and should start reform in this direction without any further delay. As the problem is vast and no statistics are available to judge the magnitude of the problem, I suggest that all Provincial Governments in India should make every effort for a start even on a small scale in this direction on the lines suggested herein:—

(1) To ascertain as far as possible the approximate number of all mental defectives in each Province.

(2) To sort out all grades of defective children from existing schools by the help of the school medical officers and establish special schools for them.

(3) To establish a large Central Provincial Institution for the training and segregation of defectives with anti-social propensities including housing of criminal defectives of all ages.

(4) Provision of adequate facilities for the training of the whole personnel required for this work such as psychiatrists, psychologists, nurses, social workers and teachers.

(5) Education of public opinion to a recognition of the racial dangers underlying the unchecked increase of mental deficiency.

(6) Eugenic sterilization of all known adult defectives of both sexes.

Life segregation in large central provincial institutions and sterilization hold out the greatest hope of most immediate and effective results. Sterilization is adopted by a number of civilized countries all over the world and it is a means of ridding the race of its defective germ plasma. Sterilization must supplement segregation as a measure of control to prevent procreation because no state, however rich, can ever afford institutional facilities for all their defectives. Sterilization therefore relieves the state of a heavy financial burden.

Drugs—(a) *Cardiazol*.—We continued our experiment with cardiazol throughout the year under report. During 1937 I tried this treatment on 42 cases of schizophrenia (31 males and 11 females). The sub-joined table shows the results.

Number of cases	Types of schizophrenics	Full remission	Improved	Stationary
15	Katatonic ..	7	4	4
17	Hebephrenic ..	5	9	3
8	Dementia paranoïdes.	1	2	5
2	Simple dementia	..	..	2

The thirteen cases which attained full remissions were subsequently discharged by the Board of Visitors of the hospital as fully recovered, three of them wrote to me that they had re-joined their services and the remaining 10 patients have so far maintained the improvement.

(b) *Photodyne*.—During the year under review six patients with marked endogenous depressions were treated with this drug but the results were not very encouraging. Only one female patient showed some improvement. I also tried this drug in my private practice but there also the results were not encouraging.

(c) *Benzedrine*.—This drug is found very useful in cases of mild depression either of exogenous or endogenous origin.

(d) *Narco-analysis*.—We tried narco-analysis with sodium evipan but the results were poor and treatment has not come up to our expectation.

(e) *Paraldehyde*.—This drug is much too universally used as a hypnotic and this is no doubt due to its

cheapness and the fact that it has no depressing effect on the heart.

Use of paraldehyde per rectum and by intramuscular injection.—Paraldehyde is one of the most useful sleep-producing drugs at our disposal and in acute cases of maniacal excitement it acts like a charm in some cases when given deep intramuscularly in the gluteal region for 12 consecutive days at a rate of one drachm per day. Similarly, paraldehyde can be used as 'prolonged continuous narcosis' in highly intractable maniacal cases when given per rectum. The dose in such cases should be one drachm per stone of patient's total body-weight. This method is largely used in general practice all over the world by surgeons to remove pre-operative fright in nervous patients before undergoing major operations. One of our highly excited patients, who showed no signs of improvement or abatement of excitement in spite of vigorous treatment by all the known hypnotics and sedatives at our command, showed marked improvement by this method.

Sulfosin therapy.—This very useful therapy was given to 86 patients during the year under report and the results were as follows:—

Recovered	Improved	Stationary
11	28	47

Correspondence

SERUM INTOLERANCE IN FAMILIES

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—Does serum intolerance run in families? This question has occurred to me in dealing with an extremely severe delayed reaction in a lady some time back.

On discussion, it came out that a few years back an uncle of the lady developed severe reactions after receiving serum. I have not come across any authoritative finding proving or disproving the contention. Both the cases got serum for the first time in life and I am loth to give any serum to any other member of the family, even if indicated.

Yours, etc.,

N. Z. KHAN, M.B.

35, AMIR ALI AVENUE,
CALCUTTA,
2nd September, 1939.

[Note.—The accepted opinion is that specific hypersensitiveness is not transmitted hereditarily, but that a general increased sensitivity often runs in families.—EDITOR, I. M. G.]

A CURE FOR SCORPION STINGS

To the Editor, THE INDIAN MEDICAL GAZETTE

SIR,—The medical profession is in search of an effective drug for the successful relief of scorpion sting from a long time. With this object the Kasauli Institute and other medical research institutions are carrying on experiments with herbal drugs, mineral salts and local anaesthetics for relieving the most excruciating and agonizing pain caused by the scorpion sting, without any success. I lately happened to try the application of coarsely-pounded fresh leaves of *Acalifus indica*. Its vernacular names being—*Kuppa mani* (Tamil), *Kuppi chettu* (Telugu), *Kuppi-ka-jhad* (Hindi) which grows ubiquitous on the manure heaps (midden-stead) in many parts of India. It can be procured very easily and grown in flower pots in every house and can thus be made available for any emergency use without much trouble or tending. This when applied to the part stung completely allays the pain and cures the condition within two or three minutes of its application. In its action it is prompt

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Lieutenant-Colonel A. S. Garewal, Superintendent, Central Jail, Jubbulpore, transferred to Nagpur as Superintendent, Central Jail, Nagpur, from 18th September, 1939.

On having been recalled from leave, Lieutenant-Colonel W. Ross-Stewart, c.i.e., resumed charge of the Office of Civil Surgeon, Lahore, on the afternoon of the 30th September, 1939, relieving Major G. F. Taylor, Professor of Clinical Medicine, K. E. Medical College, Lahore, of the additional charge.

On reversion from foreign service under the Association of the Pasteur Institute of India, Kasauli, Lieutenant-Colonel W. J. Webster, m.c., is appointed as Assistant Director, Central Research Institute, Kasauli, with effect from the forenoon of the 1st October, 1939.

Lieutenant-Colonel B. P. Baliga, made over charge of the Dum Dum Central Jail to Major S. Annaswami, on the forenoon of the 1st October, 1939.

Lieutenant-Colonel K. S. Thakur, Officiating Surgeon-General with the Government of Bengal, on relief, is appointed to be Civil Surgeon, 24-Parganas, *vice* Lieutenant-Colonel S. Nag.

Major D. P. Lambert reverted to military duty from civil, Meerut, and joined C. I. M. H., Wana, on 9th August, 1939.

Major S. A. O'Connor, an Agency Surgeon, is employed to officiate as Chief Medical Officer and Inspector-General of Prisons in Baluchistan, with effect from the afternoon of the 23rd August, 1939.

Major W. T. Taylor, on return from leave, took over charge of the Medical Store Depot, Madras, on the forenoon of the 4th September, 1939, relieving Captain (Sr. Assistant Surgeon) D. M. Frost, of the additional duties entrusted to his charge.

Major A. N. Chopra, under training at the Central Jail, Jubbulpore, appointed as Superintendent, Central Jail, Jubbulpore, from 17th September, 1939.

Major G. B. W. Fisher, Civil Surgeon, Jalpaiguri, is appointed to be the Resident Medical Officer, Eden Hospital, Calcutta, *vice* Dr. Anil Chandra Bhowmic.

Major S. Annaswami made over charge of the Midnapore Central Jail to Captain J. White, on the forenoon of the 25th September, 1939.

Major B. Chaudhuri, on the expiry of his leave, is posted to the Presidency Jail on training for a period of 1 month from the 29th September, 1939, and thereafter is appointed to act as Superintendent of the Midnapore Central Jail, with effect from the 29th October, 1939, or any subsequent date of joining.

Captain G. W. Millar was attached to the Port Health Department, Bombay, as a leave reserve officer under the Central Government, from the 21st July, 1939, to the forenoon of the 31st July, 1939, and is appointed to officiate as Port Health Officer, Bombay, from the afternoon of the 31st July, 1939, until further orders.

Captain M. S. Zan, in military employment in Burma, was transferred to civil employment in Burma, with effect from the 4th August, 1939.

Captain R. I. Reid to be Deputy Assistant Director-General (Medical Stores), Lahore. Dated 15th August, 1939.

Captain W. S. Morgan, i.m.s., is appointed to officiate as an Agency Surgeon and posted as the Medical Officer in charge of the Crown Representative's Police Force Hospital, Neemuch, with effect from the forenoon of the 20th August, 1939.

Captain M. Ata-Ullah to be Eye Specialist, Meerut District, with effect from the 9th August, 1939.

Captain E. C. Hicks to be X-Ray Specialist, Bannu. Dated 28th August, 1939.

Captain F. V. Stonham, Officer on Special Duty at the Mayo Hospital, Lahore, was posted as Civil Surgeon, Gujrat, with effect from the 11th September, 1939.

Captain J. White, Civil Surgeon, Midnapore, is appointed to act as Superintendent of the Midnapore Central Jail, in addition to his own duties, with effect from the 15th September, 1939, or from any subsequent

date on which Major S. Annaswami, now Superintendent of that Jail, proceeds to take charge of the Dum Dum Central Jail.

This cancels previous notification.

Captain E. H. Lossing, Civil Surgeon, Hooghly, is appointed to be Civil Surgeon, Jalpaiguri, *vice* Major G. B. W. Fisher.

Captain R. L. Haviland-Minchin, Assistant Director, Central Research Institute, Kasauli, is appointed a leave reserve officer against the Central Indian Medical Service cadre, with effect from the forenoon of the 1st October, 1939.

Lieutenant (on probation) H. Rees is restored to the establishment, 1st May, 1939, with seniority 1st May, 1938.

LEAVE

Lieutenant-Colonel G. Covell, c.i.e., Director, Malaria Institute of India, on foreign service under the Indian Research Fund Association, is granted leave for 1 month and 29 days on average pay, and in continuation, leave for 17 days on half-average pay, with effect from the 5th August, 1939. His services are replaced at the disposal of the Director-General, Indian Medical Service, with effect from that date.

Lieutenant-Colonel W. P. Hogg, m.c., Chief Medical Officer and Inspector-General of Prisons in Baluchistan, is granted leave for 3 months and 10 days, with effect from the afternoon of the 23rd August, 1939.

Major J. A. W. Edden, Chief Medical Officer, Delhi, was granted leave on average pay for 1 month and 22 days, with effect from the 26th June to the 16th July, 1939.

PROMOTIONS

Lieutenant-Colonels to be Colonels

T. C. Boyd. Dated 9th August, 1939, with seniority from 1st February, 1931.

R. Sweet, d.s.o. Dated 21st June, 1939, with seniority from 23rd July, 1935.

A. C. Macrae. Dated 21st June, 1939, with seniority from 23rd July, 1935.

The undermentioned I. M. S. Officers are advanced to the List of Special Selected Lieutenant-Colonels:—
Lieutenant-Colonel K. S. Thakur. Dated 9th August, 1939.

Lieutenant-Colonel M. A. Nicholson. Dated 17th August, 1939.

Captains to be Majors

P. V. Bamford. Dated 15th July, 1939.

K. Jilani. Dated 26th July, 1939.

S. M. Kharegat. Dated 15th July, 1939.

D. H. Waldron. Dated 6th August, 1939.

C. H. Dhala. Dated 8th August, 1939.

S. Narain. Dated 25th August, 1939.

To be Captain (on probation)

H. B. Wright. Dated 7th June, 1939, with seniority as Lieutenant from 21st June, 1933.

(Temporary Commission)

Lieutenant to be Captain

Thein Maung. Dated 29th March, 1939.

Lieutenant (on probation) to be Captain (on probation)

J. A. Anderson. Dated 1st September, 1939.

RETIREMENTS

Colonel D. C. V. FitzGerald, m.c., K.H.P. Dated 22nd October, 1939.

Lieutenant-Colonel R. Clifford, d.s.o., m.c. Dated 1st August, 1939.

Captain J. W. Richmond. Dated 26th July, 1939.

RELINQUISHMENTS

The undermentioned officers relinquish their probationary appointments:—

Captain (on probation) P. B. Cussack, 10th February, 1939.

Captain (on probation) N. P. Woodgate-Jones, 10th July, 1939.

Captain (on probation) G. C. A. Jackson relinquishes his probationary appointment on account of ill health, 14th July, 1939.

Notes

A CATALOGUE (1939) OF THE BRITISH DRUG HOUSE FOR MEDICAL PRODUCTS

We have just received the British Drug House's new (1939) catalogue of medical products.

It is a well-arranged catalogue with the names printed in red. This not only facilitates easy reference but adds to the appearance of this neat little book.

This British firm have a wide range of products and, at a time when a number of foreign products are no longer available, it should be particularly useful.

Copies will be supplied to readers who apply to The British Drug Houses Ltd. (Incorporated in England), Imperial Chemical House, Ballard Estate, Bombay.

KAPSEALS DILANTIN

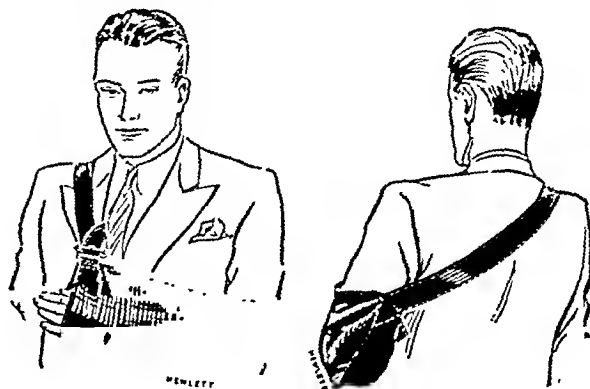
A new drug to control epileptic seizures

DILANTIN or 'Epanutin', the name by which it is known in England, was made available to the medical profession by Parke, Davis and Company, following clinical studies in epilepsy reported at the 1938 annual convention of the American Medical Association held in San Francisco. Drs. H. Houston Merritt and Tracy J. Putnam of Harvard Medical School reported on 200 cases of epilepsy treated with Sodium Diphenyl Hydantoinate (Dilantin). These two workers have more recently reported the results of two years' treatment: *Proc. Amer. Neurol. Ass.*, June 1939.

Evaluation of sodium diphenyl hydantoinate was made on patients who had not been controlled by accepted therapeutic measures such as phenobarbital, bromides, ketogenic diet, and fluid restriction. A total of 142 patients who had been under treatment with sodium diphenyl hydantoinate for periods ranging from two to eleven months formed the main part of the report. In this group *grand mal* attacks were prevented in 58 per cent, and greatly decreased in frequency in an additional 27 per cent. Seizures of the *petit mal* type were prevented in 35 per cent of patients treated, and greatly decreased in number in an additional 49 per cent. Reports of Dilantin since its introduction to the profession in Europe and America have fully confirmed the findings of Merritt

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Original Articles

FURTHER OBSERVATIONS ON PROTAMINE ZINC INSULIN IN CLINICAL DIABETES

By J. P. BOSE, M.B., F.C.S. (Lond.)

(Diabetes Research Department, School of Tropical Medicine, Calcutta)

ONE of the main difficulties that the average practitioner encounters regarding the use of insulin in clinical diabetes is the adjustment of the proper dosage, on account of insulin having no fixed or standard dosage of its own. The result is that, if proper dosages are not employed, there is either little or no reduction in the blood-sugar level if the dose is too small, or there is dangerous oscillation in the blood-sugar level, if the dose is too large. The new insulin compound—*protamine zinc insulin*—has simplified this problem to a certain extent, not only from the point of view of the doctor but also of the patient as well, though those unused to this new drug still betray some amount of pessimism regarding its use.

Before discussing the merits and demerits of protamine zinc insulin, as compared to the ordinary insulin, a broad discussion of the question of the insulin requirements of diabetic patients of various grades of severity will be helpful. We know that in a normal healthy individual there is a regulated and almost continuous secretion of insulin from the normal pancreas. This is known as the 'basal' secretion of insulin; it is augmented at times according to the physiological needs of the organism, as, for instance, after meals. By this procedure the sugar metabolism of the system is controlled throughout the day and the blood-sugar is maintained within normal limits.

In diabetes, however, the picture is quite different. The primary defect in diabetes lies in the fact that there is lack of secretion of insulin, even under basal conditions, and on the degree of this lack of secretion depends whether the case is mild, moderate, or severe. The power of the normal healthy pancreas of secreting the necessary extra amount of insulin under hyperglycæmic stimulation (as after a rich carbohydrate meal) is quite efficient, and thus the excess of sugar is removed from the blood stream and the blood-sugar level brought down to normal. In diabetic subjects, however, this power of requisitioning for the necessary extra amount of the hormone after a carbohydrate meal, is either deficient in varying degrees or almost absent according to the severity of the disease, and this naturally depends on the extent of damage which the pancreas has undergone. In the mild or

moderate types, where the organ can still produce sufficient endogenous hormone (though the supply is slow) it is able to control the blood-sugar level provided the patient's diet is lowered sufficiently, so that the amount of endogenous insulin produced is able to cope with it. In the severe cases, however, where the insulin-secreting cells of the pancreas are damaged to such an extent that they can produce very little of the hormone, the reduction of the blood-sugar level is almost negligible.

Thus, it appears that the insulin requirement of the diabetic individual depends on several factors. Apart from other abnormal factors such as infections, acidosis, etc., it appears to depend mainly on his power of requisitioning for the extra amount of endogenous insulin under the stress of hyperglycæmic stimulation of the pancreas (as after meals). A rough idea regarding this may be obtained by putting the patient on a minimum or the basal diet. If after putting the patient on the 'basal diet', the glycosuria persists and the blood-sugar remains high, the insulin requirement would then depend roughly on the amount of glucose which the patient cannot utilize in the system (i.e., the total amount excreted in the urine in 24 hours). In a milder case this will naturally be small and in a severe case high.

In the severe cases of diabetes, where the insulin requirement is high, to prevent sudden and dangerous oscillations of the blood-sugar level consequent on the big dosages, and also to keep effective control over the blood-sugar throughout 24 hours, the big single dose of insulin has to be divided and given in two or more smaller doses. This is a great disadvantage especially from the point of view of nocturnal hyperglycæmia which almost invariably happens in severe diabetes, particularly of the juvenile type. From a study of a large number of these cases, it appears to the writer that there is a tendency for the blood-sugar to rise during the early hours of the morning, i.e., between 2 and 4 in the morning. Before the advent of the new compound, protamine zinc insulin, the occurrence of this nocturnal or early morning hyperglycæmia could only be controlled by giving the patient one injection at retiring time, say at 9 p.m., and one in the early morning, say between 2 and 3 a.m.; but such a procedure, apart from the great discomfort, both to the patient and the doctor, was not always free from the danger of an occasional overdose. Since the discovery of protamine zinc insulin, however, this handicap has been removed to a great extent.

The problem of finding the insulin requirement of a given diabetic has by no means been entirely solved with the advent of the protamine zinc insulin. Owing to such disadvantages as the slowness and the uncertain continuity of its action, its summation and cumulative effect,

lack of uniformity of its action and also owing to the varying rate of absorption from the tissues, the individual requirement of protamine zinc insulin cannot be predicted with precision; but nevertheless there is no denying the fact that the use of protamine zinc insulin has several distinct advantages over the ordinary insulin. Owing to its slow, persistent and long-continued action (simulating the secretion of insulin from normal pancreas) it has helped to keep a much better and more effective control over the blood-sugar level for a long period, often without a repetition of the injection; the nocturnal hyperglycæmia and the tendency to ketosis is thus controlled in an effective way. Then again the carbohydrate can be spread out more evenly over all the meals instead of being mainly confined to those following the insulin injections as has hitherto been the practice. If the dose of protamine zinc insulin is carefully regulated, there is less likelihood of a sudden reduction of blood-sugar, and thus the risks of hypoglycæmia during sleep is obviated.

The question now arises as to how the 'basal' dose of protamine zinc insulin has to be fixed in a given case. As has been stated before, there are no hard and fast rules regarding this; one has to find a dose, which should continue its action for 24 hours, tend to bring the 'fasting' level of blood-sugar within normal limits and yet cause no hypoglycæmia during the night. This is usually possible in most cases by careful adjustment of the dose during the first four or five days, checking it by estimation of the early morning blood-sugar (about 6 a.m.), or, where this is not possible, by examination of at least two specimens of urine, *viz*, one 2 to 3 hours after the night meal and another in the early morning. If the early morning specimen continues to show sugar, it usually indicates that the blood-sugar was high and the dose of insulin has to be increased. If, on the other hand, the specimen 2 to 3 hours after dinner is sugar-free, it usually indicates that the dose of protamine zinc insulin is enough to control the hyperglycæmia and the dose has usually to be decreased to prevent sudden hyperglycæmia during sleep. If, however, the specimen after dinner contains sugar but the early morning specimen is sugar-free, it is wiser to ascertain the level of the early morning blood-sugar before an attempt is made to regulate the dose of protamine zinc insulin.

A difficult problem which sometimes confronts the physician is that some of the severe cases of diabetes receiving big doses of protamine zinc insulin have severe hypoglycæmic reactions during the night and yet show an early morning hyperglycæmia of a fair or even marked degree (table I). The author has had several cases of this type though fortunately such cases are not usually met with.

The results of a single dose of 52 units of protamine zinc insulin on a moderately severe

case of diabetes of the above type are given below.

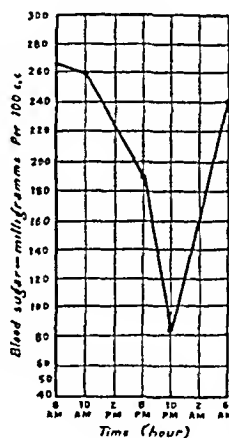
TABLE I

Patient—S. A.

Date	27/7/39					28/7/39	
	6 a.m.	10 a.m.	2 p.m.	6 p.m.	10 p.m.	2 a.m.	6 a.m.
Blood-sugar.	266	260	220	190	86	160	240

At first the patient was tried with smaller doses of protamine zinc insulin, but no appreciable reduction of either the glycosuria or the morning hyperglycæmia having been obtained the dose was gradually increased to 52 units. It was then noticed that though the patient began to get mild or moderate hypoglycæmic attacks during the night, yet there was little change in the early morning hyperglycæmia. The results are graphically represented below.

CHART 1



It would appear from the chart that there is a slow fall of blood-sugar during the first four hours after the injection of protamine zinc insulin, after which the blood-sugar continues to fall steadily and rather rapidly, so that it becomes quite low 16 hours after the injection, causing symptoms of hypoglycæmia. The total reduction of blood-sugar from the initial level is thus over 60 per cent within 16 hours. The action of protamine zinc insulin thereafter appears to wear off and the blood-sugar begins to rise steadily again. The net result is that the state of the early morning hyperglycæmia on the next day attains almost the same level as that of the previous day, the difference being only a reduction of 10 per cent even after such a big dose of protamine zinc insulin.

Having got this rather peculiar result we tried the same dose on the patient for three successive days to make sure whether the state of affairs would ultimately improve, but it did not. It was then thought that the sustained fall of blood-sugar causing hypoglycæmia was due to the big single dose of protamine zinc insulin employed and that it worked for 16 hours only, after which its action entirely ceased.

To find out whether this unsatisfactory state of affairs could be improved by reducing the dose of protamine zinc insulin but at the same time adding to it a small dose of soluble insulin (keeping the total dose almost the same), a dose of 20 units of ordinary insulin

plus 30 units of protamine zinc insulin was tried on the same patient, and was given in one injection by drawing the two solutions into the same syringe. It should be noted here incidentally that the soluble insulin should be drawn first, because being on the acid side it does not matter if a trace of it enters the buffered protamine zinc insulin.

It has been clinically observed that the intensity and the duration of action of protamine zinc insulin depends on the dosage given. If the dose given is small (within certain limits), the action is slow but prolonged. In a previous paper (Bose, 1938) it has been shown that by employing a single dose of 30 units of protamine zinc insulin no change in the blood-sugar was observed until 3 to 4 hours after the injection, when it began to fall. The rate of fall of blood-sugar thereafter, though slow, continued for about 24 hours. In the present instance, however, it has been observed that with a bigger single dose of protamine zinc insulin employed, the action became quicker and more intense but much less prolonged, so that the action appeared to wear off after 16 hours. The idea of using a smaller dosage of protamine zinc insulin and supplementing it with a small dose of ordinary insulin, as in the present case, is that the soluble insulin will act quickly and control the excessive hyperglycæmia to a certain extent during the first 4 to 6 hours, after which its action will decline or cease altogether. The smaller dose of the protamine zinc insulin, on account of its slower and prolonged action, will thereafter continue to effect the reduction of blood-sugar. The severe and the prolonged fall of blood-sugar consequent on the big single dose of protamine zinc insulin will thereby be eliminated.

The table below shows the action of 20 units of ordinary insulin plus 30 units of protamine zinc insulin on the same patient. The injection was given at 6 a.m. daily for three successive days and the blood-sugar estimated every 4 hours for 3 days running.

TABLE II

Patient—S. A.

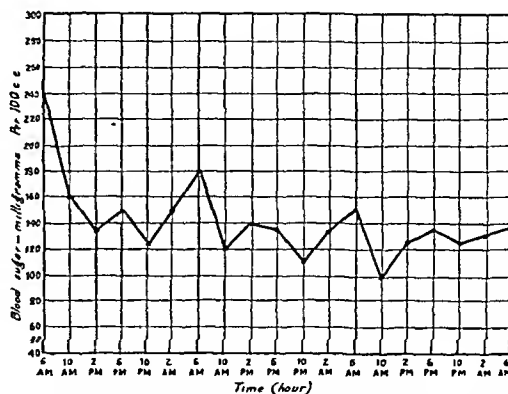
Date	Time 2 a.m.	6 a.m.	10 a.m.	2 p.m.	6 p.m.	10 p.m.
1/8	..	240	160	133	150	122
2/8	150	180	120	140	134	110
3/8	134	150	98	126	134	124
4/8	130	136	..	..	..	..

The above results are represented in chart 2.

It appears from the above table that the control of the blood-sugar is much more effective when a combined dose of 20 units of ordinary insulin plus 30 units of protamine zinc insulin is given than when a single big dose of 52 units of protamine zinc insulin is given (chart 2).

It also appears that there is a substantial improvement in the level of the early morning hyperglycæmia (6 a.m.) from day to day without any hypoglycæmia during the night. The

CHART 2



reduction of the early morning hyperglycæmia was 25 per cent after 24 hours, 37.5 per cent after 48 hours and 43.4 per cent after 72 hours.

There was also a marked general improvement in the patient's condition. When the early morning blood-sugar came down to 0.136 per cent on the 4th day, the ordinary insulin was omitted and only 20 units of protamine zinc insulin were given till the blood-sugar came down within normal limits.

Summary and conclusions

(1) The insulin requirement of diabetic individuals is discussed in a general way.

(2) The advantages of the protamine zinc insulin over the ordinary insulin is discussed. Most cases of diabetes, mild and moderate, can be kept under control by a single dose of protamine zinc insulin instead of repeated doses of ordinary insulin. It has been observed, however, that a few cases of diabetes of moderate grade of severity cannot be satisfactorily controlled by a single dose of protamine zinc insulin. In this group, satisfactory control of the blood-sugar is not usually obtained even though the dose is raised to a very high level, because it has been observed that the effect of administering such a big single dose of protamine zinc insulin was that the patient has hypoglycæmic attacks during the night and yet shows a fair amount of early morning hyperglycæmia.

(3) Better results have been obtained in cases of this group if, instead of a single big dose of protamine zinc insulin, a small dose is given supplemented by a dose of ordinary insulin and the combination given in one injection. An instance of the above is given.

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INTRAVENOUS ANÆSTHESIA WITH PENTOTHAL SODIUM

By G. R. RAWLINGS, M.B., B.Chir. (Cantab.),
D.A. (Eng.)
Calcutta

Now that further supplies of evipan sodium will be unobtainable in this country there will be a demand for a satisfactory substitute. Pentothal sodium can fulfil this need, and, in point of fact, is a vastly superior anæsthetic agent. For those anæsthetists familiar with the use of evipan a comparison between the two drugs may be useful, coupled with a description of the use and action of pentothal.

Pentothal sodium was introduced by the Abbott Laboratories in America about five years ago, and the first reports of extensive clinical trial appeared in 1935 (Lundy). In England the first report was published a few months later, early in 1936 (Jarman). Since this time, in my experience, anæsthetists who have once used pentothal have almost entirely discarded evipan.

Pentothal sodium, the sodium salt of ethyl (1-methyl butyl) thiobarbiturate, is a yellow powder readily soluble in water. It is somewhat more rapidly detoxicated and excreted than evipan. The sulphur contained in the thiobarbiturates seems to hasten their destruction in the body. When first introduced, the drug was given in a 10 per cent solution, but it has been found that a 5 per cent solution is more satisfactory, as a finer control of dosage is obtained. This also lessens the risk of tissue damage if the solution is inadvertently injected extravascularly.

During surgical anæsthesia with pentothal the skeletal reflexes are abolished, together with the corneal reflex. The pharyngeal reflex remains unaltered. Vasodilatation usually occurs, and in some cases marked conjunctival injection is seen. There is frequently a slight fall in blood pressure, but no great change in the pulse is noticeable. Pentothal, like all barbiturates, is a respiratory depressant with no direct action on the heart. Respiratory depression is definitely greater than with evipan, but this is the only important feature in which pentothal compares unfavourably with it. The ability of pentothal to cause profound muscular relaxation is one of its outstanding characteristics, and in this respect is far superior to evipan.

Administration.—Pentothal sodium is put up in ampoules containing 0.5 gramme and 1 gramme and these are dissolved in 10 cubic centimetres and 20 cubic centimetres of distilled water, respectively. The solution is injected intravenously and the patient can be made to count during the induction period, although, personally, I prefer to tell the patient to look at me and to watch his eye movements. The first 2 or 3 cubic centimetres should be given in about ten seconds and then a pause should be

made. The patient is usually asleep within thirty seconds. Muscular relaxation does not develop for a minute or so after unconsciousness, so the full effect should be awaited before the injection is continued. A 'one-shot' technique should *never* be employed except for the shortest operations lasting a minute or two, owing to the powerful depressant effect on respiration coupled with the rapid excretion. For any longer operations the anæsthetic should be given in divided doses. The needle is kept in the vein and 0.5 to 1 cubic centimetre is given at intervals as the operation progresses. The amount given is governed by the reaction of the patient. Depth of anæsthesia is gauged by the effect on respiration. The rate is little altered, but the excursion is reduced as anæsthesia deepens. Lightening of anæsthesia is indicated by small movements, diminished relaxation, and slight phonation, etc. Great care must be taken to see that the jaw is supported, as, on account of the intense muscular relaxation, it is very likely to fall back and obstruct the airway. A completely free airway is essential as respiration is already depressed and further embarrassment is likely to cause cyanosis. In some cases the insertion of an artificial airway is of great service. The preliminary injection of a dose of atropine or hyoscine is advisable to dry up secretions.

Compared with evipan, the inadvisability of using a single dose technique is an obvious disadvantage for single-handed workers. However, on the score of complete safety, the single-handed use of intravenous anæsthetics can never be recommended.

If too large a dose is given and breathing is stopped, artificial respiration should immediately be started and, if necessary, a mixture of oxygen and carbon dioxide given. As with ethyl ether, overdosage always first causes suspension of respiration, the cardiac effect being entirely secondary and due to anoxæmia. As long as satisfactory oxygenation can be maintained, death should never occur from small overdosage. Intravenous injection of coramine appears to be almost a specific antidote in pentothal overdosage, and may be used to shorten the period of unconsciousness following operation. Picrotoxin has been described as a valuable drug in the treatment of barbiturate poisoning (Lovibond and Steel, 1939).

Complications and sequelæ.—The tiresome phenomena that are sometimes seen during evipan anæsthesia, such as muscular tremors and spasm, do not occur with pentothal. As with evipan, repeated sneezing is said to occur, but very rarely. I have used the drug on some 400 occasions and the only complication that I have met has been paroxysmal coughing in two cases, followed by intense laryngeal spasm. In each case a rapid laryngoscopy revealed that this was due to a string of mucus repeatedly falling back on to the glottis. When the mucus had been removed, the coughing stopped and the

spasm relaxed. The recovery period is always quiet and not associated with the restlessness which often follows the use of evipan. I have yet to see a case of post-anæsthetic vomiting or headache after pentothal narcosis. The period of inco-ordination which follows the return of consciousness makes it imperative that the patient should be observed for some hours afterwards. He should never be allowed to drive a car for at least six hours, however normal he may appear to be.

A small proportion of cases develop a minor thrombosis in the vein used for the injection, but the 5 per cent solution lessens this risk considerably. Two or three cases have been reported in which a massive thrombosis has taken place (Payne, 1939).

Contra-indications.—The contra-indications to pentothal anæsthesia are the same as those applied to evipan. Of these the most important is dyspnoea, particularly if caused by partial respiratory obstruction. Others are marked hypotension, sepsis in the mouth or pharynx, and severe liver or kidney disease. I personally regard any operative procedure in the mouth or pharynx, which is likely to interfere with maintenance of a good airway, as a contra-indication, thus limiting the use of pentothal to cases such as the simple extraction of teeth, etc. Incidentally, it should not be given to patients who are being treated with sulphanilamide preparations owing to the sulphur atom contained in the molecule.

Premedication.—If the metabolic rate of the patient is lowered by a preliminary dose of morphia, the scope of pentothal anæsthesia can be considerably extended. The length of anæsthesia can be increased and more traumatic operations undertaken. Although I do not recommend it, on two occasions I have used satisfactorily this anæsthetic alone, when the peritoneum has been opened for perforated gastric ulcer. In my experience, the best form of premedication is a combination of omnopon and hyoscine, and I now use this as a routine. The dosage should be adjusted to the physical and psychic make-up of each individual patient, with particular emphasis on the latter element. In nervous patients these drugs are of the greatest value as they produce a quiet co-operative frame of mind, and, in many cases, actual sleep. Morphine derivatives should always be given at least one hour before operation, so that the full effect on the respiratory centre can be observed before the anæsthesia is begun. The added depressant effect makes it essential that respiration is watched very carefully when giving the pentothal.

The excellent muscular relaxation makes this anæsthetic very suitable for the reduction of fractures, and minor gynæcological operations. Like evipan, it may be used as a method of induction before inhalation anæsthesia for those patients who have a horror of their faces being

(Continued at foot of next column)

NAPHTHALENE POISONING

By N. R. KONAR, M.B.

Senior House Physician, Medical College, Calcutta

H. K. ROY, M.B.

Medical Registrar, Medical College, Calcutta

and

M. N. DE, M.B. (Cal.), M.R.C.P. (Lond.)

Professor of Medicine, Medical College, Calcutta, and
First Physician, Medical College Hospitals

(From the Department of Medicine, Medical College,
Calcutta)

NAPHTHALENE is a hydrocarbon obtained from the middle oil distillate of coal tar. Occurring in large, lustrous crystalline plates, it is easily recognized by its peculiar pungent odour. It is insoluble in cold water, but soluble in hot water, alcohol, ether, chloroform, benzene, and oils. Its industrial use is in the manufacture of indigo and of certain azo dyes. It has also been popularly employed as a disinfectant in the form of moth balls. Occasionally, it has been used internally for therapeutic purposes, as an intestinal disinfectant or vermifuge, and externally, in the form of ointment for pruritus and scabies.

Naphthalene may gain entrance into the body either by inhalation or by ingestion.

(Continued from previous column)

covered. The dose should be kept as small as possible or the decreased respiratory exchange will delay the intake of the inhalation anæsthetic.

No arbitrary statement can be made as to the length of anæsthesia which may be expected with doses of pentothal up to 1 gramme. This depends to a great extent on the operation and on the type of patient. I have seen a large man, who had received 1 gramme during five minutes for the extraction of some teeth, to be awake within the next five minutes. On the other hand, an amputation of the cervix and anterior and posterior colporrhaphy were carried out on a woman, who was given only 0.6 gramme in fifty minutes. Although certain indications may permit of larger doses being used, it is inadvisable to exceed 1 gramme. As a general rule, satisfactory anæsthesia for twenty minutes can be expected in the average patient. It has been pointed out above that the period and depth of anæsthesia can be greatly increased by the use of morphia premedication. For those who have been using evipan, it can be said quite definitely that, other things being equal, pentothal will always provide a better anæsthesia.

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Prolonged inhalation of naphthalene vapour is known to have given rise to symptoms of poisoning. Evers (1884) records a case where persons sleeping under bed clothing dusted over with naphthalene as a moth powder developed symptoms of poisoning. Lutz (Mann, 1922) also records three cases of chronic poisoning by naphthalene vapour. Poisoning by ingestion is usually accidental, occurring amongst children or insane persons. Suicidal cases are extremely rare.

The minimum fatal dose of naphthalene taken by mouth is not definitely known. It has been recorded (Mann, 1922) that in a particular case even seven grains of naphthalene produced severe symptoms of poisoning. A boy (Prochownik, 1911), 6 years old, died in two days after taking 1.75 grammes of naphthalene in seven doses as an anthelmintic. Vyas (Modi, 1936) reported a case in which a boy of 2 years died on the third day after he had swallowed a naphthalene ball weighing about 40 grains. A boy (Heine, 1913), 12 years old, who had eaten two naphthalene-camphor tablets ('bon-bons') each containing 2 grammes of pure naphthalene suffered from severe symptoms of poisoning, resembling those of alcohol but he ultimately recovered.

When naphthalene is taken by mouth, it may irritate the stomach and cause nausea and vomiting. This may get the poison out of the body, in which case further development of symptoms does not take place. Mild irritation of the stomach also occurs when the poison has been inhaled. This occurred in the cases cited by Evers and Lutz. If the ingested naphthalene is not vomited, it passes into the small intestine where it becomes absorbed into the portal circulation. Naphthalene is usually taken in an insoluble form, so that in order that it may be absorbed there must occur in the intestine some physicochemical process, which, at present, is little understood. Wieland and Sorge (1916) have shown that naphthalene forms a co-ordination complex with desoxycholeic acid. This complex, naphthalene choleic acid, has been shown to be easily soluble and absorbable. Recent experimental observations of Stekol and Mann (1937), however, do not confirm the rôle played by desoxycholeic acid, as naphthalene may be absorbed even without the presence of bile in the intestine.

The first vital organ which naphthalene meets after its absorption from the intestine is the liver. This organ, vested with the powers of detoxication, attempts to get rid of the poison partly by excreting it in the bile and partly by oxidizing it to β -naphthol and then combining it with glycuronic, sulphuric and mercapturic acids (Stekol, 1935). These products after detoxication pass into the general circulation from where they are filtered out in the kidneys. The liver itself does not remain unhurt during the process; its glutathione content diminishes markedly (Nakashima, 1934) and acute necrosis

of the polygonal cells takes place here and there. This in its turn produces the clinical manifestations of jaundice and cholæmia. A part of the poison which has not been successfully detoxicated enters the general circulation and exerts its harmful effects on various other important structures. Red blood corpuscles may be hæmolyzed, the myocardium may be enfeebled, the higher cerebral centres may suffer functional depression, and the kidneys also may share the general damage. Thus will arise the clinical manifestations of rapidly developing anæmia and even hæmoglobinuria, enfeebled circulation and weakened heart sounds, confusion and coma, albuminuria, cylindruria and hæmaturia. Optic neuritis, cataractous changes in the eye lens and opacities in the cornea may also occur in the chronic forms of poisoning (Bouchard and Charrin, 1886; Leschke, 1934).

We came across some of the above deleterious effects of naphthalene in a fatal case of poisoning, the notes of which we append below. So far as our knowledge goes, this is the second case of fatal poisoning due to naphthalene reported in India, the first report being that of Vyas to which reference has already been made.

Case note

L., Mohammedan, aged 24 years, was admitted into the Medical College Hospital, Calcutta, in a semi-conscious state on 4th June, 1939. The attendant said that the patient took some naphthalene (exact amount was not known) by mistake in place of an Indian sweet on 2nd June.

On examination.—The patient was semi-conscious; axillary temperature 99°F.; pulse rate 120 per minute; respiration rate 28 per minute. He looked pale and severely jaundiced. No signs of trauma were found on the head, neck or body. There was nothing in the breath suggestive of poisoning. Liver and spleen were not palpable. Heart sounds were feeble, lungs clear, pupils equal and reacting well to light. The neck was soft but Kernig's sign was positive. All the tendon reflexes were sluggish. Superficial abdominal reflex was absent. Babinski's sign was positive on both sides.

Twelve hours later, the coma deepened, pallor became more marked, heart sounds became feebler and the rectal temperature rose to 102°F. Systolic blood pressure was 95 and diastolic 48 mm. of Hg. At this stage a lumbar puncture was done. Ten cubic centimetres of clear cerebro-spinal fluid came out under slightly increased pressure.

After another twelve hours, the patient's condition became worse. There was evidence of right-sided hemiplegia. The rectal temperature rose to 103°F. The pulse rate was 142, and respiration 44 per minute. Patient ultimately expired—three days after swallowing the naphthalene.

Laboratory findings.—Blood examination report:—Hæmoglobin 30 per cent; red blood corpuscles—2,410,000 per c.mm.; white blood corpuscles—31,200 per c.mm.; polymorphonuclear cells—90 per cent; lymphocytes—8 per cent; monocytes—2 per cent. No malarial parasites were found. Plenty of normoblasts and marked anisocytosis were noticed.

Urine examination report:—Colour—brown; reaction—acid; specific gravity—1020; turbidity—slight; albumin—trace; sugar—nil; acetone—nil; bile—present. Occult blood test—negative; indican—nil. Microscopically occasional pus cells, few epithelial cells and mucus.

Biochemistry of blood:—Urea—53 mgm. per cent; non-protein nitrogen—46 mgm. per cent; cholesterol—

106 mgm. per cent; chloride—468 mgm. per cent. Van den Bergh reaction—immediate direct positive; bilirubin contents—20 units. Wassermann reaction of blood was negative.

Cerebro-spinal fluid:—Clear fluid, microscopically no pus cells or organisms seen. Culture—no growth.

Autopsy findings.—Rigor mortis all over the body. Pupils dilated. Conjunctiva—markedly icteric. Scalp layer stained yellow. Brain and spinal cord stained yellow. Larynx and trachea—mucus stained yellow and contained froth. Lungs—yellow frothy exudations from sections on pressure. Heart—thin fluid blood on both sides. Peritoneum—stained yellow. Gastro-intestinal tract—mucous membrane yellow. Kidneys—pale. Spleen—congested. Gall-bladder full of bile. Liver—soft, pale.

Histology.—Patchy necrosis of the liver, chiefly in the central zone. Naphthalene was detected in the tissues, in the stomach contents and in the urine by the chemical examiner.

Comments

The remarkable features of the above case were deepening coma, severe jaundice, rapidly developing anæmia, hyperthermia, and patchy hepatic necrosis, as revealed by the post-mortem examination. Such features of naphthalene poisoning have not been frequently noticed by the previous reporters. Indeed, there is no mention of hyperthermia, hemiplegia and marked anæmia in the previously recorded cases reviewed by us. The marked degree of anæmia which developed so rapidly was possibly due to acute hæmolysis, although, in this case, there was no hæmoglobinuria. This hæmolysis enhanced the jaundice primarily caused by hepatic necrosis. Hyperthermia might be explained by the cholæmia consequent to liver necrosis, like the hyperthermia met with in cases of acute yellow atrophy of the liver. It is also possible that, in the metabolism of naphthalene, naphthylamine (an amino derivative) was formed and was responsible for the fever. Naphthylamine has been used by laboratory workers for causing experimental hyperthermia.

Summary

1. A brief review of cases of naphthalene poisoning has been made.
2. Metabolism of naphthalene and its effects on the body have been discussed.
3. A case of fatal poisoning has been described, including its autopsy findings.
4. The possible pathogenesis of the unusual features has been suggested.

We are grateful to Colonel J. C. De, I.M.S., Superintendent, Medical College Hospitals, Calcutta, for the permission to publish the case, to Dr. K. N. Bagchi, Rai Bahadur for the report of the chemical examination of the viscera, to Major D. Ahmed for the post-mortem reports, to Capt. P. De for the biochemical reports and to Prof. B. P. Tribedi for his permission to undertake the histological examinations.

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CARDIO-VASCULAR SYPHILIS AND CEREBRAL SYMPTOMS

By P. G. GOLLERKERI, M.D.

Pathology Department, Medical College, Rangoon

THE clinical results of a syphilitic infection have long been described in more or less definite three stages: primary, secondary and tertiary. This division into stages has been possible apparently because of a hypothetical tissue susceptibility of the various types of body tissues at different periods of the infection. We are taught that after the primary sore on the genitals or elsewhere—the lesion at the site of entry of the organism associated with trauma—the skin and mucous membranes follow with a rash, etc., in a regular sequence, and later, after a variable period, the so-called tertiary symptoms appear in the internal viscera.

Anyone with a long clinical experience in a general hospital will have been struck by the number of syphilitics (as proved by the Wassermann reaction) who do not show or give any history of the disease going through the different stages. Often, syphilis in a patient is discovered when he develops signs or symptoms of an aortic aneurysm or of coronary artery damage with thrombosis. Ordinarily, however, a syphilitic does not die of his infection in the earlier stages, or even in the later stages, unless one of the vital organs is involved. A more severe secondary infection, such as tuberculosis, sets in, from the lowered vitality of the syphilitic infection, which kills him off.

The writer still remembers the quaint aphorism that used to be dinned into him during his student days 'Syphilis is the bed on which tubercle is born'. In a general hospital, if a patient comes with symptoms of any disease that cannot be directly referable to a syphilitic infection, these symptoms get diagnosed and treated; and it is only when this treatment becomes unsuccessful, partially or

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wholly, that syphilis is thought of. Many cases get involved in a serious major operation, avoidable at any rate in some of them. The clinical history and the subsequent post-mortem examination of a recent case admitted into the Rangoon General Hospital lends colour to the contention that a Wassermann reaction of blood should be a routine procedure with every admission with the slightest doubt about the diagnosis, before treatment is commenced.

J. A., aged 30 years, was admitted on the morning of 20th June, 1939, for the treatment of persistent vomiting which started about 2 a.m. that day. On admission he complained of giddiness and vomited twice within the space of half an hour. Vomiting was effortless and projectile in character and seemed to have no relationship to food. Patient was quite conscious and was calling out for a receptacle whenever he felt the desire to vomit. He also complained of occipital headache. There was no history of a previous attack of this kind, nor of injury or fall to account for these acute and sudden symptoms. The patient denied any history of venereal disease. With a provisional diagnosis of cerebral tumour he was admitted into the wards. Temperature 97.6°F., pulse 84 and respiration 20 at this time.

In the ward, the patient preferred to lie curled up with the head tilted to one side, away from bright light. The eyes showed a right lateral deviation. Though conscious, he took no active interest in his clinical examination or in the surroundings. He was constantly groaning and looked dull and listless. The pupils were equal and reacted sluggishly to light. Abdomen showed some fullness, but was soft on palpation and tender on deep pressure. There was no enlargement of liver or spleen. A feeble peristalsis could be made out on auscultation of the abdomen. The knee and ankle-jerks were present.

Two mornings later, the staff nurse reported that the patient would not talk or take his feeds, so that nasal feeding was resorted to. He showed at this time a left-sided hemiplegia which was not noticed the previous evening—possibly it came on in the course of the night. He had fewer attacks of vomiting now, though he was still apathetic and unconcerned with his surroundings. Temperature—97.2°F., pulse—94, and respiration—32. Routine stool examination was negative for protozoa, ova, cysts and cell exudates. Suspecting a cerebral neoplasm, the skull was x-rayed with the report 'No abnormality to suggest the presence of a new growth'.

In the course of the next few days he seemed to be improving somewhat, having got over his paralytic symptoms and to some extent his gastric symptoms. On the seventh day of admission, it appears he took his feeds in the morning and was able to sit up in bed and use his limbs normally. Towards the evening—about six hours later—he suddenly became worse with intensification of his nausea and a definite left-sided hemiplegia. He died that night after a stay of about a week in the hospital.

Post-mortem examination (about four hours after death)

Body was that of a well-developed male, aged about 30 years. Abdomen somewhat distended, rigor mortis in the upper part of the body. On opening the abdomen distension with gas was noticeable chiefly in the colon and the stomach. A loop of jejunum about 18 inches long showed what looked like a typical hæmorrhagic infarction. The mesenteric vessels of this loop were standing out prominently against the pale fatty background. Cutting into the mesentery across the vessels, long worm-like clots were recovered intact from the lumens. The infarcted (?) loop was abruptly cut off on either side from normal looking intestine. No notable changes were seen in the spleen, liver, kidneys, etc.

In the thorax except for a small solid area (about $\frac{1}{2}$ inch across) in the upper lobe of the left lung, and predominantly a left ventricular hypertrophy nothing grossly abnormal was detected. The valves of the heart looked normal, and the aorta showed a smooth intima. The hypertrophy of the left ventricle was put down to a possible dilatation of the aortic ring without any damage to the cusps themselves. The solitary lung lesion was later proved to be a hæmorrhagic infarct histologically.

The cranium was carefully opened up, as the clinical signs and symptoms pointed to a brain lesion (tumour?). But for a little emptiness of the superficial vessels no gross change was noticeable anywhere. The brain was sliced through various points on the surface after noting the normal appearance and contents of the ventricles. No hæmorrhagic focus, nor any softening could be detected in any of these sections.

After collecting the blood serum from the cardiac chambers for the Wassermann reaction an anatomical diagnosis of syphilis was provisionally made to explain the thrombotic phenomena in the intestine and lung and the ante-mortem clinical symptoms. Fortunately, also the cerebro-spinal fluid drawn the day before his death was also available for the Wassermann reaction. Both the blood serum and cerebro-spinal fluid were put up the same day for the Wassermann reaction and the reports were ++ for blood and ++++ cerebro-spinal fluid.

Comment

Failing to find any other direct pathological evidence to explain the cerebral and the gastro-intestinal symptoms, one has to fall back upon syphilis. Throughout the course of an untreated syphilitic infection, except for the tertiary gumma, the various manifestations can be explained by the minute lesion around the capillaries from an irritation of the blocking by the treponema of the perivascular lymphatics. Histologically, this perivascular inflammation of the smaller vessels is so characteristic that it is often the first hint of the diagnosis of syphilis.

Taking the cerebral symptoms first, the early symptoms were those of irritation and later of hemiplegia. Now, it is well known that when a vessel becomes narrowed, from inflammation and later a fibrosis of its wall, the rate of flow of blood through such a channel becomes slowed down though the blood pressure tends to be greater at its mouth. This slowing down of a column of blood is probably the most important prelude to thrombosis. Thrombotic phenomena in the coronaries and elsewhere, whether from a syphilitic stenosis or from a degenerative sclerosis, have this primary slowing down of the stream for their development. If the vaso-motor nerves add to this organic defect in the vessel by a spasmodic constriction, an acceleration of the development of the symptoms is assured so that the onset would be sudden and acute. Ordinarily, a point in the diagnosis of a syphilitic thrombosis, in a vital organ like the brain, is the comparatively slower development of the signs than those of a hæmorrhagic lesion, though in both these the signs, when fully established, may be the same. On the basis of a slow clotting of blood in some of these cerebral vessels, the symptoms of giddiness and headache, of which this patient complained, can be explained. The

attacks of hemiplegia occurred probably when the vessel segment got more or less completely cut off from thrombosis and vaso-constriction producing severe anæmia of the part supplied by the vessel. For the disappearance of the hemiplegia one has to suppose that the blocked vessel became patent again to allow the required amount of blood to reach the region of its supply. This may easily happen if we suppose that the clot contracted sufficiently and the vaso-dilator mechanism again came into play to let it pass on to the venous side. Contraction of a blood clot is such a familiar phenomenon *in vitro* but there is no reason why this should not take place *in vivo* also. The small infarct found in the lung could possibly be a result of this arterial clot getting into the venous circulation, as reasoned above, and reaching the lung filter through the branches of the pulmonary artery.

The gastro-intestinal symptom of vomiting, described as effortless and projectile, is quite easy of explanation. The post-mortem finding of a loop of jejunum definitely cut off from the rest of the bowel in an infarction suggests that these were symptoms of a paralytic ileus. Acute intestinal obstruction brought about by paralysis of a loop or any part of the bowel (like the appendix) is well known to produce these violent symptoms, which, with their spasmodic nature and absence of a definite local history prior to onset, are apt to be mistaken for a symptom of central origin as happened in this case. A 'cerebral tumour' was the provisional diagnosis and attempts to substantiate this by x-rays, etc., led to the undoing of the clinicians in the correct diagnosis of the case.

But for the Wassermann reactions of the post-mortem blood and ante-mortem cerebro-spinal fluid (which was drawn only as a therapeutic measure to relieve pressure) the ante- and post-mortem evidence of syphilis is very obscure. The aorta in tertiary syphilis in a young man shows the characteristic longitudinal fissuring of the intima, so aptly likened to the crinkling of a tree bark. In the present case the intima of the aorta was quite smooth and the myocardial hypertrophy of the left side was put down to a dilatation of the aortic ring rather than to any defect in the cusps of its valve. In none of the other internal organs was there any syphilitic stigma detectable with the naked eye.

Summary

A fatal case of cardio-vascular syphilis is described in which the signs and symptoms ante-mortem pointed to a tumour of the brain. Explanation of these symptoms is attempted from the pathological evidence obtained at the post-mortem examination. A case for a routine blood test for syphilis, of all cases coming to a hospital without a straightforward diagnosis, is made out.

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CALCIFICATION OF RENAL TUMOURS

By HERSCHEL C. ALDRICH, B.A., M.D. (Ohio State University, U. S. A.)

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THERE are very few references in the literature to calcified renal tumours. A few of the standard textbooks on urology mention that calcification of renal tumours occurs under certain conditions. Braasch and Griffin (1936) of the Mayo Clinic report on the significance of the radiographic evidence of calcified deposits in renal tumours in relation to prognosis. Cahill and Melicow (1938) of the Presbyterian Hospital, New York, report a series of 118 renal tumours since 1929. Eighty-two of these tumours were of the renal parenchyma, as proved by operation and pathology; 16 were of the renal pelvis, and the remaining 30 were Wilms tumours, fibromas, fibro-sarcomas and leiomyosarcomas, together with a few cases which because of markedly diffused metastasis were neither operated on nor classified. Of this series of 118 renal tumours, careful study of the roentgenograms showed 14 cases in which calcification could be demonstrated. Twelve of these 14 cases were subjected to nephrectomy, and, in all of these cases, the tumour was of the renal parenchyma. Several cases of tumour of the renal pelvis had intrapelvic calculi, but in none of these cases was there any evidence of calcified shadows within the tumours themselves. Pathological sections of the 12 tumours operated upon showed in all a hyper-nephroid carcinoma. Braasch and Griffin in their series found that the prognosis in calcified renal tumours was better than in those not calcified; while Cahill and Melicow found the reverse to be true.

The calcification seen in parenchymal renal tumours must be differentiated from renal lithiasis and from somewhat similar calcification occasionally observed in renal tuberculosis. More rarely calcified retro-peritoneal and mesenteric lymph nodes, and perhaps calcified guinea-worm deposits, when situated in such a position as to overshadow the kidneys, may have to be considered. The calcification in renal tuberculosis is usually of a more general and evenly-deposited mottled type. Renal tuberculosis and renal lithiasis can usually be

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I am indebted to Mr. B. Veda of the final M. B. class of this college for parts of the clinical history of the case, and to Dr. U Ba Than, M.B., F.R.C.S.E., police surgeon, Rangoon General Hospital, for his kind permission to investigate the case post mortem.

Since writing the above paper, the writer came across an editorial on the subject of spasm of the cerebral arteries in the *British Medical Journal* (1939, i, p. 1292), with obvious significance *a propos* the views expressed in this paper.

excluded by a careful cystoscopic examination, including retrograde pyelograms and a careful study of the clinical data. The calcification seen in parenchymal renal tumours may occur in various forms. Typically, however, the shadows occur in irregular clusters and strands. Deposits of this typical appearance occur only in parenchymal renal tumours.

The pathology of calcification in any tumour is one of areas of hæmorrhage within the tumour substance, followed by necrosis and then calcification.

In a series of 2,102 roentgenograms taken at the American Methodist Mission Hospital from 1st November, 1933 to 1st August, 1939, there have been 579 covering the area occupied by kidneys and renal tumours. In this general group of 579 abdominal roentgenograms, there were six diagnosed as renal tumours or possible renal tumours. This series of renal tumours does not include some eight or ten cases of very large cystic renal tumours found in young children of which roentgenograms were not taken because of the obvious diagnosis. Two of the six cases showed calcified deposits; one was diagnosed as an advanced tuberculous kidney, and proved to be such; the other was diagnosed as a malignant parenchymal tumour with areas of calcification. The report of this case follows:—

Case note

Male, aged 45, Hindu Patel by caste. This patient when first seen presented himself with a purulent urethral discharge of some four days' duration and complained of burning and frequency of urination. He denied previous discharges. Urethral smear was



Case no. 6647.
Calcified renal tumour.

taken, and the laboratory reported numerous Gram-negative intracellular diplococci. The case was diagnosed as that of a recurrent chronic gonococcal prostatitis. This patient was next seen three weeks later, at which time the discharge was still unchecked, and the prostate on examination was found to be irregularly enlarged and very hard in consistency, suggestive of malignancy. The treatment for the urethral discharge was continued. A week later the patient returned and at this time the discharge was much less. The chief complaint of the patient at this visit was much difficulty

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YAWS IN CHATRA SUBDIVISION OF HAZARIBAGH DISTRICT, CHOTANAGPUR

By G. N. SINHA, L.M.F., L.T.M.

Medical Officer, Pratappur District Board Dispensary

THE disease is prevalent in Pratappur *thana* of this district. This *thana* is in a very out-of-the-way part of the district on the border of Palamaun and Gaya districts. It is reported that this disease has been known to exist in this area for a long time and it is known as 'Saoiya ghao'. Although this dispensary was opened in 1921, it appears from the previous

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was taken following a barium enema. This showed a partial obstruction of the descending colon due to a large pear-shaped calcified tumour, apparently originating from the left kidney and displacing the colon laterally. A cystoscopic examination was made a week later. The findings at this examination were as follows:—

A no. 24F cystoscope was passed into the bladder with moderate obstruction in prostatic urethra. The bladder mucosa showed no signs of inflammation. However, there were noticed several strands of thick muco-purulent material resting on the bladder mucosa near the ureteric orifices. The ureteric orifices were normal in appearance.

A no. 5 ureteric x-ray catheter was introduced up the left ureter to a distance of 17 cm., where an impassable obstruction was met.

A no. 5 ureteric x-ray catheter was passed up the right ureter to a distance of about 2 cm. where it was obstructed and could not be introduced further. Specimens of urine were obtained from the bladder and both right and left kidneys. The laboratory report on these specimens showed the presence of pus in all the three. No organisms were found. (Cultures were not made.) A retrograde pyelogram was made after the injection of sodium iodide solution on the left side. A photograph of the roentgenogram obtained accompanies this report. The points to be noticed in this are: A large pear-shaped tumour apparently attached to, or a part of, the left kidney showing extensive areas of calcification mottled irregularly and in strands. The renal pelvis is deformed and flattened in appearance showing a type of defect frequently found in renal tumours. The ureter is bifurcated (congenital defect). A diagnosis of left renal parenchymal tumour (carcinoma) was made in this case and an operation advised. The patient however refused.

Summary

1. Calcification of renal tumours occurs occasionally and is found typically in malignant parenchymal tumours.

2. The roentgenographic findings in such cases, as a rule, are such as to make the diagnosis certain.

3. A report is given of one case of such a tumour found in a series of 579 routine and special roentgenograms taken covering the abdomen.

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records that no case was diagnosed here till December 1938, by the writer. No other cases have been seen by the writer in other parts of the district but it is endemic in this *thana*. From a record of 52 cases it appears that the disease occurs most frequently among Bhuiyas, Dusads, Ganjhus, Ahirs and Turis but is also found among other castes. Higher Hindu castes such as Kayasthas, Brahmins and Rajputs generally escape, probably because of their greater cleanliness. It is less common amongst Mohammedans. It is more common amongst the males. Children and adolescents are mostly affected although no age is exempt. The study of the source of infection showed that about three-fourths were from near relatives and others from distant relatives or non-relatives. Several cases in one family are frequently found. Regarding the transmission of the disease, it was found that in 90 per cent of cases there was a definite history of contact.

A characteristic feature of the disease in this locality is the persistence of the primary lesion together with the secondary lesions for several months. The primary sore was extra-genital in every case. Constitutional symptoms such as pains in joints, muscles and bones are generally absent in the primary stage in about 50 per cent of the cases, but they become very severe in about 40 per cent of the cases in the secondary stages, so much so that the sufferers often pass restless nights and become quite unable to do their ordinary work. The secondary eruptions were found mostly on the face, angles of the mouth, axillæ, genitals, perineum and extremities and there were a few on the trunk. The secondary lesions together with the pains of rheumatic type last from several months to one to two years. Pains in joints persist even after the healing of the eruptions in about 80 per cent of cases. Lesions on the palms and soles were found only in 10 per cent of cases. Circumscribed painful periosteal nodes were seen on the anterior aspects of both tibiæ in one case only. Gummatous nodules and chronic indolent ulcers on the extremities were generally seen in the tertiary stages. In some cases deformities of the extremities were found. Recurrences of secondary lesions were reported in about 50 per cent of the cases. Death from the disease is practically unknown.

Treatment.—Novarsenobillon (N. A. B.) and Mapharside (Parke, Davis and Co.) were given and the results were so remarkable that now patients from distant villages come here for treatment whereas previously they had an idea that there was no cure for their disease. N. A. B. from 0.3 to 0.45 gm. or mapharside 0.04 to 0.06 gm. was injected intravenously, the dose being repeated at 5 to 7 days' intervals. The number of injections necessary varied from 3 to 4. The immediate result of this mode of treatment was very satisfactory in all primary

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WILLETT'S FORCEPS

A COMMENTARY ON THEIR VALUE IN THE TREATMENT OF PLACENTA PRÆVIA, ESPECIALLY AS APPLIED TO INDIAN CONDITIONS

By J. EDIS-MYERS, M.R.C.O.G. (Lond.)

CAPTAIN, I.M.S.

District Medical Officer, Bellary

WILLETT (1925) first published his account of the treatment of placenta prævia by scalp forceps and weight traction, in 1925. He describes the treatment of seven cases by means of a modification of de Martell's surgical scalp forceps—the modification being the increase in length of the handles to $7\frac{1}{2}$ inches. His two resident medical officers assured him that they found the method both easy and quick, and that it never failed to check the bleeding.

Jennings (1932) has used Willett's forceps in over fifty cases and personally prefers them to other methods of treatment, although he does not quote any figures. Vignes and Tisserand (1937) both consider the method excellent. Their opinion is that the indications for Cæsarean section are diminished. They quote Gauss (1934) as having excellent results.

von Pall (1936), out of fifty cases, has used the method seventeen times in $5\frac{1}{2}$ years. In the

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and secondary cases, except in one mild case where there was relapse following apparent cure after one injection of N. A. B. 0.45 gm. Mapharside was found superior to other arsenicals and no toxic symptoms were seen in any case after its use. Weak and debilitated patients tolerate it well. Arseno-paritran (Bathgate and Co.) was used intramuscularly in one case but the result was not encouraging.

Bismuth salts.—Bismuth oxychloride, bismuth cream (B. W. and Co.) and bismo-paritran (Bathgate and Co.) were tried in doses of 1 to 2 c.cm. intramuscularly bi-weekly on account of the high cost of N. A. B. and allied preparations. The number of injections varied from six to eight but the results were slow and not so satisfactory and the patients began to discontinue attending for injections as the result was not so prompt. Locally boric ointments were given to apply. During convalescence, an iron tonic mixture was given. Potassium iodide orally was found ineffective.

My thanks are due to Messrs. Parke, Davis and Company and Bathgate and Company for their kindly supplying me free samples of mapharside and paritran (arseno and bismuth) for trial.

I am indebted to Rai Sahib Dr. S. B. Dutt, Civil Surgeon, Hazaribagh, for his kindly going through the article and for his permission to publish this note.

other cases, there were two cases not requiring treatment, seven cases had membranes ruptured artificially, five cases of Braxton-Hicks version, three cases treated by de Ribe's bag, and six cases of Cæsarean section. He does not quote any figures.

These findings coincide with ours in Madras. We have been using the same type of forceps as described above and have found them most satisfactory. For a time we were using a pair with handles 11 inches long, but we found that the grip on the scalp was definitely weakened by the added length of handle and we went back to the 7½-inch handle.

Since 1925, Willett's forceps have proved their worth as a method of treatment.

Advantages

1. In many cases they can be applied without an anæsthetic (cases 2, 3, 5, 6 and 7).

2. Their application entails a minimum amount of manipulation—a valuable advantage in cases which are first seen in a state of collapse after a severe hæmorrhage (case 1).

3. They can be applied effectively with the os only one-fifth dilated (cases 7 and 4). The only alternative treatment here would be Cæsarean section with all the multitudinous necessities which that entails.

4. Their application does not need any special knowledge or skill. The accoucheur should be quite competent after one or two applications.

5. It enables the accoucheur to make use of the normal and best dilator of the cervix—namely, the head.

6. As regards the fœtus, all the dangers and fatalities of manipulation are eliminated. The only complications liable to ensue from the use of the forceps are those due to injury to the scalp, which is uncommon and generally of a localized and minor nature.

7. The instrument itself takes up very little room, does not deteriorate with age, and it is of a type with which all medical men are familiar, namely the scissor handles and ratchet. It is sterilized very simply and completely, namely, by boiling.

8. They employ the natural dilator, namely, the head and consequently this undergoes normal moulding. There is therefore little risk of cranial damage to the fœtus—compare the after-coming head in a breech after version (Browne, 1937).

Disadvantages

1. In cases of central placenta prævia, the application is made more difficult by the necessity of having to tear through the placenta first. If, however, treatment other than Cæsarean section is employed, namely, de Ribe's bag or

podalic version, this manœuvre still has to be carried out, consequently this disadvantage is nullified.

Central placenta prævia is rare as compared with lateral cases and is generally of such a grave import that Cæsarean section is the only satisfactory treatment.

Here again, I venture to suggest that, if Cæsarean section cannot be carried out owing to the local circumstances, Willett's forceps can be used with greater advantage and more easily than de Ribe's bag and podalic version.

2. The forceps are liable to come off if the labour is at all protracted or the patient very restless (case 2). This disadvantage is of a minor nature, however, in that they are easily reapplied and the restlessness can be treated with appropriate drugs.

Case 1 is an instance of the value of Willett's forceps. She was an 11th-para admitted in an exhausted semi-conscious state with all the signs and symptoms resulting from a severe loss of blood. She was definitely in no fit state to undergo any extensive operative or manipulative treatment. I am quite certain in my own mind that any interference of this nature would have killed her very quickly.

Willett's forceps were put on with no difficulty and they absolutely stopped all further bleeding. The patient was delivered six hours after their application.

The os was only two-fifths dilated and version would have been difficult, if not impossible, and would have entailed further bleeding which, added to the extensive hæmorrhage that she had had, almost certainly would have brought about a fatal issue.

The shock and hæmorrhage attendant on a Cæsarean section would have caused the same result.

As it was, the mother nearly expired two or three times after delivery and sustained uterine sepsis during the puerperium from which she slowly recovered.

Taking all the evidence and weighing it with an unbiassed mind, I feel certain that Willett's forceps undoubtedly saved this mother's life, and that no other means of treatment could have done so.

It would appear, therefore, that for cases which are *in extremis*, we have in these forceps a very useful and powerful means of turning what is to all intents and purposes a hopeless case into one with a successful termination. It is at once apparent that Willett's forceps should prove to be a boon to the country practitioner in most countries and more so than ever in India.

In India most of the village communities live some distance from a big hospital with a staff

capable of performing Cæsarean section, but there are numerous small dispensaries in charge of a doctor and most villages are near a medical man.

A doctor trained in the use of Willett's forceps therefore has all that he requires to treat a case of placenta prævia reasonably successfully. He can carry out all the treatment that is necessary.

For most of the country people in India, getting to a fully-equipped hospital is out of the question—distances are too great and more often than not the only means of transport is the bullock cart. Cæsarean section is not therefore a possible means of treatment.

The local doctor can then consider the possibility of doing a podalic version. Supposing him to be familiar with this manœuvre, it still has many dangers and contra-indications. Sepsis is more or less certain to follow intra-uterine manipulations in the Indian climate in the *mofussil*, which without hospital facilities is fairly certain to prove fatal.

He can consider using de Ribe's bag. This is practically an impossibility, as in India they perish very rapidly and the ordinary practitioner is therefore not trained in their use.

There remains vaginal packing which is at the best a poor hæmostatic and unless properly performed under an anæsthetic is no use at all. Here again the possibility of sepsis supervening is great.

We now come to the latest means—Willett's forceps.

1. The Indian practitioner, with very little training with this instrument, can become quite a competent performer.

2. They are reasonably cheap to buy. The average practitioner in India is far from being a wealthy man.

3. They are indestructible in the Indian climate.

4. They are easily carried and very easily sterilized by the simplest means of all—boiling—available in the smallest and most primitive Indian household.

5. They involve no more manipulation or handling of the parts than is done in a vaginal examination.

6. They give very good hæmostasis without the necessity of an anæsthetic—the latter sometimes an impossibility in the Indian countryside.

7. Labour generally progresses evenly and successfully, with termination in a moderate time after application. This is reassuring and comforting to the patient, the doctor, and also the relatives.

The results as regards foetal and maternal mortality in the Hospital for Women and

Children, Madras (Hospital Reports, 1932–1936), for the last five years are as follows:—

		MOTHER		CHILD	
		Number of cases	Died	Still-born	Died
1936	Willett's forceps	5	1	3	2
	Cæsarean section	1	1	..	1
	Int. podalic version	2	0	..	1
	Bi-polar version	1	0	1	..
1935	Willett's forceps	11	0	4	1
	Cæsarean section	8	4	1	3
	Int. podalic version	6	1	2	2
	Bi-polar version	..	..	..	..
1934	Willett's forceps	3	1	1	1
	Cæsarean section	1	0	0	1
	Int. podalic version	6	3	3	1
	Bi-polar version	..	..	..	..
1933	Willett's forceps	6	0	2	2
	Cæsarean section	..	..	..	..
	Int. podalic version	2	0	1	..
	Bi-polar version	..	..	..	..
1932	Willett's forceps	1	0	..	..
	Cæsarean section	4	1	2	2
	Int. podalic version	..	..	..	..
	Bi-polar version	..	..	..	..

The cases in these tables are those in which only the following obtained:—

1. Vertex presentation only.
2. Cases which needed interference in order to stop the bleeding.
3. Cases which were not complicated in any other way.

Other cases, *e.g.*, placenta prævia with a breech presentation or placenta prævia not necessitating any active interference, etc., are not included as they are not germane to the subject.

It will be seen from the above tables that there were 57 cases of placenta prævia with otherwise uncomplicated vertex presentation necessitating active interference to stop hæmorrhage.

Of these 57 cases:—

Twenty-six (45.6 per cent) were treated by Willett's forceps with a maternal mortality of 2 cases = 7.7 per cent, and a foetal mortality of 16 = 61.5 per cent.

Ten (17.5 per cent) were treated by Cæsarean section, with a maternal mortality of 5 = 50 per cent, and a foetal mortality of 6 = 60 per cent.

Twenty-one (36.8 per cent) cases were treated by podalic version with a maternal mortality of 5 = 23.8 per cent, and a foetal mortality of 15 = 71.4 per cent.

These mortality figures, taken all round, are very high—much higher than the English figures, but the type of patient treated in Madras has to be taken into account—generally overworked, under-nourished, anæmic and

diseased. In addition these are the record of cases which all needed interference on the part of the obstetrician in order to stop bleeding.

Statistics are notoriously far from being infallible, especially in such a very small number of cases, but there is, I think, sufficient evidence here to prove that in Willett's forceps we have a very valuable means of treating placenta prævia—a means which is within the power of any medical practitioner to apply in whatever circumstances and environment he may practice.

I wish to thank Major-General N. M. Wilson, Surgeon-General with the Government of Madras, for permission to publish this commentary.

Case 1, age 35 years, Hindu, 11 para. Admitted 24th August, 1937, at 1-30 a.m.

Previous pregnancies and confinements all normal. Has been in labour since 11 a.m., 23rd August, 1937. Complaints of painless bleeding on and off since onset of pains. Examined outside by corporation nurse.

Examination.—Exhausted, semi-conscious, restless, sighing respiration. Anæmic. Heart and lungs—nil abnormal. Pulse—124. Fair volume. Regular. Temperature—98. Urine—bladder empty. Fœtal heart—143. Regular. Heard to the left and below umbilicus. Blood pressure—110/70.

Palpation.—(1) Height of uterus—38 weeks. (2) Condition of uterus—not contracting. (3) Position of fœtus—vertex. L. O. A. Head floating above brim. Can be made to engage.

Vaginal examination.—Os 2/5 dilated. Placental tissue felt posteriorly and laterally. Membranes entire. Head presenting. Rather profuse bleeding. Blood pressure—105/80.

2 a.m.—Under light chloroform anæsthesia. Membranes ruptured artificially and Willett's forceps applied. 1½ lb. weight attached. Patient very restless. Morphia gr. 1/8 injected subcutaneously. M. P. 126. Volume and tension poor.

4 a.m.—Fœtal heart not audible. No bleeding.

4-50 a.m.—No pains. M. P. 100. No bleeding.

6-35 a.m.—Strong pains. Head fixed and going through. No bleeding.

8 a.m.—Birth of male child—deeply asphyxiated, 8 lb. in weight. Revived with difficulty.

8-35 a.m.—Placenta expressed, entire. After nearly expiring several times during the next 24 hours, the patient improved, but developed uterine sepsis which cleared up with treatment, and she was eventually discharged fit.

The baby after being revived twice, finally expired a few hours after birth.

Case 2, age 16 years, Hindu, 1st para. Admitted 28th November, 1937, at 12-10 p.m.

Complains of bleeding since 4 a.m. to-day. Has been in labour since 3 a.m. yesterday. Examined outside by corporation nurse.

Examination.—Not anæmic. No cedema. Heart and lungs—nil abnormal. Pulse—118. Good volume. Regular. Temperature—98. Urine—1020 acid. Nil abnormal. Fœtal heart—138. Heard on right side below umbilicus. Blood pressure—110/80.

Palpation.—(1) Height of uterus—full time. (2) Condition of uterus—contracting feebly. (3) Position of fœtus—vertex. R. O. A. Head appears to be fixing. Can be pushed well into the brim. No disproportion.

Pelvic measurements.—Int. C.—9½ inches. Int. S.—8½ inches. Ext. C.—7½ inches.

Vaginal examination.—Os 2/5 dilated. Membranes present—thin over the head which is presenting. Placental tissue felt anteriorly and to the left.

12-20 p.m.—Membranes ruptured. Bleeding recommenced. Willett's forceps applied without anæsthetic and 1½ lb. weight attached. No bleeding.

2-45 p.m.—The patient pulled the forceps off. Re-applied. No bleeding.

4-20 p.m.—Birth of live male child, 4½ lb. weight. There was no bleeding after 12-20 p.m. M. P. 76.

4-30 p.m.—Placenta expressed. Entire. The patient made an uninterrupted recovery.

The baby was premature and very weakly but was alive and taking food on discharge from hospital.

Case 3, age 30 years, Hindu, 6 para. Admitted 24th May, 1937, at 3-20 p.m.

Previous pregnancies and confinement all normal. All children alive.

Now complains of painless bleeding at 3 p.m. yesterday and again this morning at 11 a.m. Has had slight labour pains since early this morning.

Examination.—Anæmic. Heart—boundaries normal. Systolic murmur not conducted outwards. Lungs—nil abnormal. Pulse—92. Temperature—98.4. Urine—1010 acid. Nil abnormal. Fœtal heart—140. Heard on left side below umbilicus. Blood pressure—115/70.

Palpation.—(1) Height of uterus—full time. (2) Condition of uterus—contracting. (3) Position of fœtus—vertex. L. O. A. Head up and floating. Cannot be pressed into brim. There seems to be no disproportion.

4-15 p.m.—*Vaginal examination*. Os 2/5 dilated. Membranes thin over the head. Head high up. Placental tissue felt on right side. Bleeding profusely after examination.

4-30 p.m.—Willett's forceps applied without anæsthesia. 2 lb. weight attached. Bleeding stopped.

5-30 p.m.—Patient has lost about 5 ounces of blood since forceps were applied. Pulse—120. 1/4 c.c.m. pituitrin given.

9-50 p.m.—Birth of live female child 5½ lb. in weight. M. P. 100. Has had no bleeding since 5-30 p.m.

10-7 p.m.—Placenta expressed. Fair amount of bleeding with it. M. P. 136. Placenta entire. Rupture in membranes next to placental margin.

After rather a shaky 24 hours, the puerperium was normal and the patient made an uneventful recovery.

Case 4, age 22 years, Hindu, 2 para. Admitted 25th March, 1937, at 6-10 a.m.

Previous pregnancy and confinement—normal. Child died soon after birth.

Now complains of bleeding since 5 a.m. to-day. Has no labour pains. Not examined outside.

Examination.—Not anæmic. No cedema. Heart and lungs—nil abnormal. Pulse—64. Temperature—98.4. Urine—1020 acid. Nil abnormal. Fœtal heart—not heard. No fœtal movements. Blood pressure—130/100.

Palpation.—(1) Height of uterus—30 weeks. (2) Condition of uterus—not contracting. Soft. (3) Position of fœtus—vertex. L. O. A. Head floating. Can be engaged in brim.

Vaginal examination.—Cervix soft. Os one-finger, loose. Head presenting. Blood clots in vagina. Placental tissue felt posteriorly. Membranes absent. Patient to be watched for further signs of bleeding.

9 a.m.—Bleeding recommenced. Under CHCl₃ anæsthesia, Willett's forceps applied, 1½ lb. weight attached.

5-30 p.m.—Birth of still-born female child, weighing 4 lb. The patient had no bleeding since the application of the Willett's forceps.

6 p.m.—Placenta expressed. Membranes were ruptured near placental margin.

The patient made an uneventful apyrexial recovery.

Case 5, age 30 years, Hindu, 4 para. Admitted 13th May, 1937, at 12-50 p.m.

Previous pregnancies.—All three normal pregnancies and confinements.

Complains of slight pains for the last three days and bleeding since 9 a.m. to-day. Examined outside by barber midwife.

Examination.—Not anæmic. Heart and lungs—nil abnormal. Pulse—104. Temperature 99. Urine—bladder empty. Fœtal heart—136. Regular. Heard on right side below umbilicus. Blood pressure—120/80.

Palpation.—(1) Height of uterus—full time. (2) Condition of uterus—rather tense. Not very tender.

Contracting strongly. (3) Position of foetus—vertex. Head not fixed. ? R. O. A.

Vaginal examination.—Os 2/5 dilated. Membranes present. Vertex presenting. Placental tissue felt to the left and posteriorly. Bleeding moderately fast.

1-30 p.m.—Willet's forceps applied without anaesthetic. 2 lb. weight attached (1½ lb. did not seem to quite stop the haemorrhage). Urine—1010 acid. No albumin.

5 p.m.—Not having very strong pains. Very slight amount of bleeding. Foetal heart 116. Irregular.

11-20 p.m.—After increasingly strong pains from 6 p.m., birth of a deeply asphyxiated male child. Could not be revived. M. P. 100.

11-55 p.m.—Placenta expressed. Entire. M. P. 102. The patient made an uninterrupted recovery. No puerperal rise of temperature or bleeding.

Case 6, age 35 years, Christian, 8 para. Admitted 4th May, 1937, at 9 a.m.

Previous pregnancies and confinements.—First six all natural and children alive. Seventh pregnancy—abortion.

Complaints of painless bleeding since last night. This is the first bleeding. Has been in labour since 1 a.m. to-day. Slight bleeding present now.

Examination.—Slightly anæmic. Heart and lungs—nil abnormal. Pulse—124. Temperature—98.4. Urine—Bladder empty. Foetal heart—130. Regular. Heard on right side below umbilicus. Blood pressure—130/75.

Palpation.—(1) Height of uterus—37 weeks. (2) Condition of uterus—contracting feebly. (3) Position of foetus—vertex. R. O. A. Head floating, but can be pressed into pelvic brim.

Vaginal examination.—Os 2/5 dilated. Membranes present. Vertex presenting. Placental tissue felt to the left and posteriorly. Patient bleeding freely.

9-30 a.m.—Membranes artificially ruptured. Willett's forceps applied without anaesthesia. 1½ lb. weight attached. No bleeding at completion.

12 noon.—Patient having strong pains. No bleeding.

12-45 p.m.—Birth of live male child. Weight 7 lb. M. P. 120.

1 p.m.—Placenta expressed

1-20 p.m.—No bleeding.

Patient had a mild urinary infection during the puerperium which cleared up with cytotropine. The lochia were healthy throughout.

First and second stages—12 hours.

Third stage—15 minutes.

Case 7, age 25 years, Hindu, 2 para. Admitted 27th September, 1937, at 8-15 a.m.

She gives a history of previous pregnancy and confinement normal. Has had slight pains for one hour only. Reports slight bleeding per vaginam from 6 a.m. Has had no previous bleeding.

Examination.—General condition good. Heart and lungs—nil abnormal. Has slight oedema of legs ? filarial. Has not been examined outside. Pulse—96. Temperature—97. Urine—1010 acid. No albumin or sugar. Foetal heart—144. Heard on the right side below umbilicus. Regular. Blood pressure—148/100.

Palpation.—(1) Height of uterus—36 weeks. (2) Condition of uterus—contracting. (3) Position of foetus—vertex. R. O. A. Head floating. Cannot be pressed into brim, though there seems to be no disproportion.

Pelvic measurements.—Int. C.—8½ inches. Int. S.—7½ inches. Ext. C.—6½ inches.

There was no bleeding and few pains on arrival in hospital.

4-35 p.m.—Bleeding again commenced and a vaginal examination was done. P. V. Os 1/5 dilated. Vagina full of blood clot. Membranes absent. Vertex presenting—high up. Placental tissue felt to the left and posterior. Temperature—98.4. Pulse—80. Foetal heart 152. Willett's forceps applied without anaesthesia and 1½ lb. weight attached.

5-15 p.m.—Patient having strong pains. Foetal heart not heard. M. P. 85. Patient has not bled since forceps were applied.

(Continued at foot of next column)

AN OUTBREAK OF EPIDEMIC DROPSY IN A CLOSED COMMUNITY

By C. L. PASRICHA

MAJOR, I.M.S.

Professor of Bacteriology and Pathology

S. LAL

Research Worker, Indian Research Fund Association

K. S. MALIK

Biochemist, Indian Research Fund Association

and

P. K. BISWAS

Resident Surgeon, Eye Infirmary

(from the Epidemic Dropsy Enquiry, Indian Research Fund Association, School of Tropical Medicine, Calcutta)

AN outbreak of epidemic dropsy amongst boys living in an institution was recently studied. As there were certain interesting features in this outbreak a short account of it is recorded.

The boys are housed well and lead a healthy well-regulated life. They receive a varied and a well-balanced diet. Each boy is given half a pint of milk and two big slices of bread with molasses in the morning. The midday meal consists of rice, pulses and fresh vegetables as curries cooked in mustard oil and fresh fruits. The evening meal is similar to the midday meal with the addition of animal protein which consists of fish on five days and fresh meat on the other two days of the week. This community had been free from epidemic dropsy since 1933 in which year nearly half the number of the boys had been affected. From January 1939, 242 boys ranging from 12 to 18 years of age were kept under medical observation.

In January 1939 two of the boys developed sarcoids. There was a history of mild diarrhoea lasting two days. In one boy there was slight oedema of the legs, in the other boy although there was a history of heaviness and swelling of the legs there was no oedema at the time of the examination. There were no other signs or

(Continued from previous column)

6-30 p.m.—Birth of still-born male child. 6 lb. in weight.

6-55 p.m.—Placenta expressed. Entire. Membranes ragged.

First and second stages—11½ hours.

Third stage—25 minutes.

Patient made uneventful recovery and was discharged on 9th October.

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symptoms. No other cases occurred till May 1939 when 11 boys reported sick and were found to have œdema of the legs. In June 1939 further cases occurred and as a result of the examination of the 242 boys living in this colony 37 boys were found to have signs and symptoms of epidemic dropsy.

The initial symptoms in the majority of the affected boys were mild diarrhœa and fever lasting two to three days, followed by œdema of the legs. The outstanding features in this outbreak were:—

(1) The development of sarcoids in 17 or 46 per cent of the 37 boys affected. The distribution of sarcoids was as follows—head and neck 2, front of trunk 11, back of trunk 4, arms 1, legs 10. The size of the sarcoids was variable, from a pin-point to 8 mm. with the majority about 2 to 4 mm. in diameter. Sections of sarcoids removed from two of the patients gave microscopic appearances similar to those recorded by Chopra, Choudhuri and Panja (1935).

Intradermal injections of ground-up freshly-removed sarcoids into man and laboratory animals gave negative results. Intradermal inoculations in the supra-orbital tissues of a monkey also gave negative results. The latter were done to exclude infection by an organism resembling *Bartonella bacilliformis*, the causative organism of verruca in which the nodules have a superficial resemblance to the sarcoids of epidemic dropsy.

(2) The eyes of the 37 affected boys were examined with results summarized in table I.

(ii) One boy had definite cupping of the fundus with intra-ocular tension within normal limits. He complained of 'haloes'. This boy was probably recovering from glaucoma.

(iii) In one boy the cornea was slightly œdematous but the ocular tension was within normal limits (30 mm. and 35 mm.). The disc was normal in appearance.

As a control, 16 boys living in the same colony and who had no symptoms of epidemic dropsy were examined for the presence of increased tension or changes in the disc. Nothing abnormal was noted in any of these boys.

The affected boys were examined a month later. The intra-ocular tension had become normal and there were no subjective symptoms.

(3) Eight or 22 per cent of the 37 boys suffering from epidemic dropsy had traces of albumin in their urine and in four boys granular casts were present in centrifugalized deposit. Calcium oxalate crystals were seen in 15 of the 37 samples of urine examined.

(4) The sedimentation rate of red blood cells of 16 of the affected boys was estimated, employing Westergren's method. The cell volume, the hæmoglobin and the fibrin nitrogen content were also determined (table II).

The sedimentation rate is increased in epidemic dropsy. The average sedimentation rate (corrected) of a control series of 24 healthy individuals was found to be 6.86 mm. in 1 hour. The fibrin nitrogen content is also increased but is within the high normal limit, the

TABLE I

The results of the examination of the eyes of the 37 boys suffering from epidemic dropsy

Serial number	Cornea media	Fundus oculi	INTRA-OCULAR TENSION (MM.)*		Subjective symptoms
			Right eye	Left eye	
1	Clear	Healthy	55	55	Haloes, pain, dimness of vision.
2	"	"	45	50	Haloes, burning and watering.
3	œdematous	"	45	45	Haloes, burning and watering.
4	Clear	"	43	35	Burning and watering of eyes.
5	œdematous	"	30	35	Dimness of vision.
6	Clear	'Cupping'	25	31	Haloes.
7-37	"	Healthy	20-30	20-33	No eye complaint.

* The tension was estimated with a MacLean's tonometer.

From the results summarized in table I it will be seen:—

(i) Four of the 37 boys had increased ocular tension. These boys complained of burning sensation (three boys), 'haloes' (two boys) and dimness of vision (one boy—tension 55 mm. in both eyes). In one boy the cornea was œdematous with a healthy disc suggesting early glaucoma.

average normal fibrin nitrogen content being 30 mgm. per 100 c.cm. of blood.

A study of table II suggests that the sedimentation rate, the fibrin content and the cell volume are interrelated. An increase of fibrin leads to increase of sedimentation rate provided the cell volume is the same. An increase of cell volume decreases the sedimentation rate provided the fibrin content is constant.

TABLE II

The sedimentation rate, fibrin nitrogen content, cell volume and hæmoglobin in 16 boys suffering from epidemic dropsy

Sedimentation (mm.) after 1 hour	Fibrin nitrogen (mgm. per 100 c.cm.)	Cell volume percentage	Hæmoglobin grammes per cent
93	62.8	33.3	10.5
91	40.3	31.9	9.3
75	57.7	38.2	13.7
74	58.3	37.6	11.4
70	58.3	38.5	12.8
72	49.3	34.5	10.6
65	45.8	34.8	10.3
48	40.4	37.1	11.8
47	41.1	33.7	13.2
44	46.0	38.4	13.5
43	40.1	36.4	12.7
39	55.2	40.0	13.0
32	46.6	38.8	11.1
30	44.9	34.0	9.9
20	41.6	40.1	11.5
20	28.0	34.2	10.6

The blood sedimentation rate of nine boys living in the same colony and who appeared to be in perfect health and had no symptoms or signs suggestive of epidemic dropsy was estimated. These boys were selected at random.

TABLE III

The sedimentation rate and the cell volume in nine apparently healthy boys living in the same colony and who had no symptoms of epidemic dropsy

Number	Sedimentation (mm.) after 1 hour	Cell volume percentage
1	122	33.3
2	61	36.0
3	59	41.4
4	55	37.7
5	50	40.9
6	50	33.9
7	45	35.0
8	36	35.6
9	19	41.7

From the results (table III) it will be seen that the sedimentation rate of the blood is increased in all the nine boys. It is suggested that these boys who had no clinical evidence of epidemic dropsy were according to the results of the sedimentation test in a 'pre-epidemic-dropsy state'. These results suggest the value of this non-specific test, the sedimentation rate of red blood cells in indicating disease where other tests fail. The blood sedimentation test would be of value in epidemiological studies. Unfortunately, as no further cases developed it was not possible to investigate this point further. The value of the blood sedi-

mentation test in differential diagnosis is illustrated by the following example:—

A well-built non-Bengalee adult who had suffered from swelling of the feet for about three months was diagnosed clinically as suffering from epidemic dropsy. The patient stated that he did not use mustard oil in any form. The blood sedimentation rate was found to be within normal limits and on further examination the œdema was found to be of cardiac origin.

Investigations as to the factors concerned in this outbreak:—

(a) *Rice*.—Rice had been given twice daily throughout this outbreak, but was stopped in June when a number of cases had occurred. The samples available for examination in June 1939 were of healthy parboiled rice without any opacities in the grain and without any fungal attack.

(b) *Mustard oil*.—The mustard oil used was drawn from one source of supply. The seeds from which this oil was expressed were from one consignment of mustard seeds which had been received a year previously. The ration of oil was 2 ounces per day per boy. This oil gave a positive nitric acid test for argemone oil. The intensity of colour suggested that argemone oil was present in about 1 per cent concentration.

(c) Other foodstuffs were of good and varied quality and fresh vegetables and meat were supplied daily.

Early in July 1939 when there were 37 boys suffering from the disease, rice was omitted from the diet and the boys given bread (as *chapattis*), and three weeks later the use of mustard oil for cooking purposes was also stopped and clarified butter (or *ghee*) used. No further cases occurred. The affected boys examined a month later were found to be well. Unfortunately, owing to the popular belief that rice is mainly responsible for the causation of the disease, it was not possible to continue the use of rice. Cases however continued to occur even after rice had been stopped and it was not till the use of mustard oil was discontinued that the occurrence of fresh cases ceased.

Summary -

An outbreak of epidemic dropsy in a closed community of boys is described. Of the 242 inmates 37, or 15.2 per cent of the boys, developed epidemic dropsy. Of the 37 boys affected 17, or 46 per cent, had sarcoids.

The blood sedimentation rate, the fibrin nitrogen content, the cell volume and hæmoglobin percentage of 16 affected boys were determined.

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THE ASCHHEIM-ZONDEK AND THE FRIEDMAN TESTS IN THE DIAGNOSIS OF THE LIFE AND DEATH OF A FÆTUS

By C. L. PASRICHA

MAJOR, I.M.S.

Professor of Bacteriology and Pathology

S. LAL

Assistant Research Worker

and

K. BANERJEE

Assistant Professor of Pathology

(from the Department of Bacteriology and Pathology,
School of Tropical Medicine, Calcutta)

ALTHOUGH a negative Aschheim-Zondek test (or the more rapid modification, the Friedman test) is not by itself diagnostic of fœtal death, a positive result with either of these tests is of value in indicating that the fœtus is alive. The following case illustrates an important application of these tests:—

A diagnosis of a dead fœtus was made in a woman aged 25 who was pregnant for about six months. This diagnosis was based on the inability to hear fœtal heart sounds and on the apparent cessation of growth of the uterus after three examinations carried out at three-weekly intervals. The woman who felt well and was active had not been informed of the suspected death of her child. She felt no fœtal movements and the repeated enquiries about the movements from her anxious husband led the young expectant mother to suspect that all was not perhaps well. The patient was advised that unless labour set in naturally within a short period labour should be induced. The Aschheim-Zondek and the Friedman tests were done with a specimen of her urine and gave positive reactions. The tests were done according to the methods advocated by Browne (1938). The methods are summarized below:—

(a) The Aschheim-Zondek test

1. Five female mice 3 to 4 weeks old and weighing 6 to 8 grammes each were injected subcutaneously in the buttock with slightly acidified urine. The injections were given twice daily for three days. Doses at each injection were:—

Mouse 1	..	..	..	0.2 c.cm.
" 2	..	..	..	0.25 "
" 3	..	..	..	0.3 "
" 4	..	..	..	0.3 "
" 5	..	..	..	0.5 "

2. The mice were killed at the end of 100 hours after the first injection.

3. The ovaries were enlarged, pinkish and contained small pin-point hæmorrhagic points (from 1 to 3 in each ovary). The hæmorrhagic points were readily seen by the naked eye. The test was positive in all the five mice.

(b) Friedman test

1. A virgin female rabbit 14 weeks old was used. For this test the rabbit must not be less than twelve weeks old.

2. Two intravenous injections, each of 6 c.cm. of the morning urine, were given daily for two days.

3. On the third day, i.e., 48 hours after the first injection, the animal was killed and the ovaries inspected. Large corpora hæmorrhagica were seen projecting on the surface of the ovaries. This constitutes a positive test.

For control purposes similar tests were done with specimens of urine from a pregnant woman known to have a live fœtus and from a woman who was not pregnant.

Discussion.—The Aschheim-Zondek and the Friedman tests for pregnancy were positive with the urine of the woman whose fœtus was thought to be dead and with the urine of the woman known to have a live fœtus. Both these tests were negative with the urine of a woman who was not pregnant. According to Browne (*loc. cit.*), the Aschheim-Zondek test is correct in 98 to 100 per cent of cases. This author states 'It seems to depend on the presence of living chorionic epithelium and may therefore be used as a test for death of the fœtus. Since, however, the chorionic epithelium survives for some time after the death of the fœtus, the test does not become negative for eight to twelve days after fœtal death has occurred; but if there has been gradual interference with the placental circulation prior to its complete cessation, such as occurs in placental infarction, it may become negative in three days'. Since the death of the fœtus had been suspected to have occurred more than two months prior to the time the tests were done, it was concluded that the fœtus was not dead. This opinion was supported by two x-ray pictures taken at four hours' interval. In the first picture the fœtus was seen lying with the head in the right iliac fossa with both the arms pointing downwards. In the next picture the position of the two arms had changed, one arm was pointing upwards by the side of the head and the other arm across the chest. There was no overlapping of the skull bones nor any marked curvature or angulation of the spine, nor any general crowding together of the skeleton.

The positive Aschheim-Zondek and Friedman tests supported by the x-ray pictures led to re-investigation of the history of the case. There had been some confusion as to the last menstrual period. The rest of the pregnancy was uneventful and the woman was delivered of a live child four months later.

Summary

The case is recorded in which on clinical examination the death of the fœtus was suspected. The Aschheim-Zondek and the

(Continued at foot of opposite page)

MALARIA IN CHOTA NAGPUR

By C. STRICKLAND, M.A., M.D.

(from the School of Tropical Medicine, Calcutta)

AN outbreak of malaria at Hazaribagh on the Chota Nagpur plateau in Bihar in a certain segregated community has led to the following report on what appear to be the important factors in the matter.

Fry (1912 and 1914) approached the subject from another direction, and showed that villages on the plateau have a comparatively low spleen-index (7 per cent in 528 children): the following records by the writer confirm his figures:—

Village	Number of children examined	SPLENOMEGALY INCIDENCE	
		Number	Percentage
Tatisilwai ..	40	7	17.5
Mandu ..	33	6	18.0

On the other hand he found that villages along the ghats* cutting the face of the plateau escarpment were intensely infected and he noted that two particular villages, Angarah and Bundkhela, situated at the top of the ghats but otherwise apparently quite similar to villages on the plateau were as highly infected as any he had found at the foot of the scarp, and they are notoriously malarious.

His findings are instructive, relating as they do to two areas of observation one of which can be regarded as a control of the other. In the two areas, the plateau and the ghats, only the physiography of the terrain varies. In both there are terraced rice-fields, though on the ghats the terracing is steeper. Over the plateau the stream flows more gently, so that surface run-off of storm-water is slower, but, on the other hand, as the land is at a higher altitude, seepage is more rapid and the water 'table' is lower. The communities are the same in each case, so there is no justification for regarding malaria as a social disease. Only physiographical factors differ.

As for differences in the climatic conditions, Fry's observations prove one very important point. This is, that upon the plateau, as at

Angarah, at an altitude of approximately 2,000 feet, the climatic conditions are not inhibitory to malariogenesis. One might of course have presumed this from the incidence of malaria in the Darjeeling foot-hills, where severe epidemics and a spleen index of 55 per cent and more have occurred at an altitude of about 2,500 feet, i.e., in a region where foot for foot the climate is cooler than on this peninsula plateau. Climatic inhibition then does not account for the relative freedom from malaria of the plateau in general*.

If then on the plateau climate is no bar to malariogenesis and malaria comparatively speaking is slight, what can be the reason for this? What can be the explanation of the ghats being so malarious, the plateau so non-malarious? As stated, only the physiography varies and this considerably. The village tanks, and other hold-ups of the surface-water, and the wells, are the same in both tracts, but the rice-fields are more steeply terraced on the ghats, the stream instead of flowing slowly over the plateau now runs fast down its rocky channel, and the further one descends the longer the period during which the streams flow, and the greater the amount of the spring water cropping out on to the surface. Even in the fair-weather season the stream runs fast down the ghat, although there are now numerous shallow pools along its course, whereas on the plateau the stream bed is largely sandy and discrete pools on its bed are relatively infrequent.

During the rains, in neither the plateau streams nor ghat streams are there many anophelines; they are scoured away. It is in the fair season that they survive, but then the mosquito-breeding places on the sandy riverbeds of the plateau streams are few and far between, as compared with the innumerable rocky pools, ideal for mosquito larvæ, that mark the courses of the ghat streams. A factor of importance in this matter must be the equability of the flow in the two types of stream; those on the plateau maintain an equable flow, on the ghat they are torrential, i.e., they swell with a storm and subside at its passing. Equability in the flow of a stream is an important factor in malariogenesis, a matter that will now be referred to, in relation to the influence of natural enemies.

The more equable and gentler the flow of water in a stream and the greater the accessibility

* 'Ghat' may mean either the length of the scarp or the approach to the plateau up a steep valley.

(Continued from previous page)

Friedman tests were positive and led to the revision of the clinical diagnosis. Eventually the woman gave birth to a live child.

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Browne, F. J. (1938). *The British Encyclopædia of Medical Practice*, Vol. X. Butterworth and Co. (Publishers), Ltd., London, p. 62.

* One may note here that there is a difference in the seasonal incidence of malaria in the two regions. In the Himalayan foot-hills at an altitude of 2,500 feet, and indeed round 2,000 feet, the incidence of malaria is vernal; autumn is too cold for malariogenesis there, while on the Chota Nagpur plateau on the other hand the incidence of malaria tends to the common plains type, i.e., autumnal, though it is definitely earlier than on the plains, as also is maximum mortality (Fry). That is what one would expect from the point of view of the cooler climate in its bearing upon the potential infectivity of the mosquito. At higher altitudes on the plateau, one should find an even earlier malarial incidence than in the villages recorded by Fry.

of the mosquito-breeding places to natural enemies, like fish, the greater will be the destruction of the mosquitoes. A torrent that is seoured out with great violence during a rain-storm and a little later is represented by a series of pools from which there is no surface flow at all is in an ideal condition for the production and full development of mosquitoes long before their natural enemies, such as fish, can be established therein.

Another factor in the matter may be more frequent, 'deviation' by domestic animals, on the plateau.

It is not along the sandy-bedded streams of the Chota Nagpur plateau only that one finds a comparative freedom from malaria. On the plains of Bengal too one notices along all the sandy-bedded rivers that one can recall to mind, e.g., the Damodar in Burdwan District, the Ajay and the Barakar also, the Subarnarekha in Midnapur, that they are characterized by healthy communities living along their banks.

Other things being equal one need not perhaps look for any other reason for the differential malaria incidence in the plateau villages and the ghat villages than those differential physical characters in the streams. When the rains stop, mosquito breeding starts, but to a much greater extent along the ghat streams, and that causes the autumnal epidemic.

From the cessation of the rains onwards more and more of the streamlets dry up as one ascends the ghats, so that by the end of the 'hot-weather' there is very little surface-water at all on the plateau and high up the ghats; there is much more in the streams and swamps at the foot of the hills. If then there is a high malaria rate in the villages at the top of the ghats it can only be derived from the stream in autumn and perhaps winter. Now if the fair-weather streamlets at the foot of the ghats run for such a longer period than those upon the ghats, then the villages in the former situation should be the more malarious, but, as was narrated above, that is not the case, and the reason for this is that in the lower situation the climate is too hot for the development of the malaria parasites, and, moreover as Fry says, the mosquitoes then die out*.

Different factors operate in the two zones to control infection in either during the hot weather. The autumn is the only season when there are mosquito-breeding places and mosquito production in both tracts, and a

* In the hot weather in the plains although the mosquito dies out because of the heat, and at the head of the ghats never comes into being because there is no water, yet it will be observed that in both tracts by the autumn it becomes prevalent enough to produce the annual epidemic. One has seen stated that in certain parts of Bengal pathogenic mosquitoes only start to breed in the autumn but then it is too late for malariogenesis. The above narrated facts, however, show that that argument is fallacious,

suitable temperature for development of the parasite.

With regard to the plateau itself one must repeat that, while the autumnal temperature is suitable for infection, eulieidigenesis is too scanty for it to be of any importance and that is the state of affairs that also pertains to all the big river-beds in Bengal.

One must consider, however, the possibility that the different physiography of the ghat streams leads them to support a different anopheline fauna, perhaps the streams having a more rapid surface run-off carry sweeter water and yield a different and perhaps more malariagenic anopheline fauna.

From this point of view Senior White and Das' (1938) observation in the Singhbhum District that the *funestus* group was perhaps solely responsible for the malaria there makes one suspect that it also occurs on the Chota Nagpur ghats, though here one goes to considerably higher altitudes than those observed by Senior White. Nevertheless, the writer has never found this species* in Chota Nagpur and Fry mentions that he did not find the adults of *funestus* ('*listoni*') in the highly-infected villages, when *culicifacies* and *jeyporiensis* were swarming, nor could he find larvæ of '*listoni*' on combing out the water of the rice-fields. The possibility of *funestus* races being responsible in the ghat villages is indeed quite hypothetical, and as it also has not been recorded from the streams on the plateau no differentiation in respect of this species or in fact of any other has been established.

At the same time Fry, like Senior White in Singhbhum, could not find those putatively infective species, *culicifacies* and *jeyporiensis*, infected. He examined 76, a sufficient number in a hyperendemic village to have yielded something positive if they had been culpable, unless the season was rather too early. The writer found *culicifacies* and *jeyporiensis* plentiful at Hazaribagh.

It may be noted that where the plateau and the ghats merge into one another intermediate grades of spleen-index are found, and whereas at Ramgarh the profile of the ghat stream (figure 1) flattens out, which, torrential though it be, does not partake of the full character of a ghat stream, the spleen-index is also intermediate in magnitude.

* The types of breeding places examined by the writer on the plateau and their mosquito fauna may be stated as follows, for record:—

Rice-fields under seepage water	<i>jeyporiensis</i> <i>nigerrimus</i> <i>pallidus</i> <i>annularis</i> <i>splendidus</i>
Stream-beds (nullahs)	.. <i>pallidus</i> <i>culicifacies</i> <i>jeyporiensis</i>
Bandhs (reservoirs)	.. <i>annularis</i>

The influence of *bandhs* (figures 2 and 3), as are called the reservoirs produced by damming up a line of surface drainage, may be here



Fig 1—Showing the Damodar river at Ramgarh

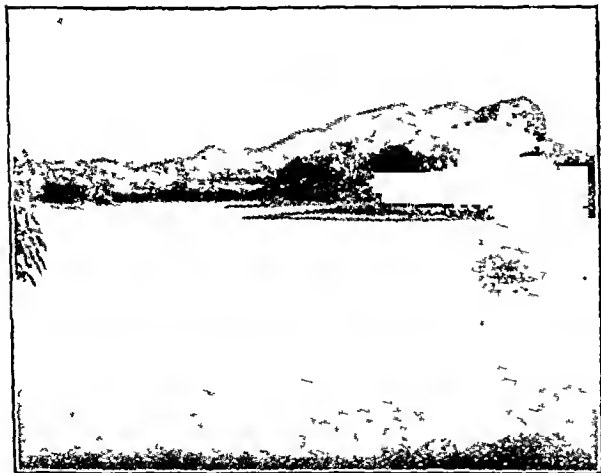


Fig. 2.



Fig. 3.

also mentioned. At Mandu there are two such *bandhs* overgrown with aquatic vegetation (figure 3), such as would in certain other

parts of India make the politicians talk vociferously about the iniquity of a Government allowing such a thing and call to the colours every able-bodied citizen to clear the nuisance. Yet the spleen-index of this place was about 18 per cent, and that it was as high as this was possibly due to it not being very far from a small ghat stream. Mosquito larvae were not easily found in these *bandhs*.

They hold perennial water and if the non-perennial stream at the head of a ghat be highly malarigenic in the autumn, why should not these perennial *bandhs* be highly malarigenic?

If there be no difference in the species of anophelines they support, the reason may be ascribed to the existence of 'natural enemies' in these collections of water.

Finally, it is interesting to note that in this part of the country, man for the purposes of his livelihood has sometimes unwittingly carried out anti-malarial measures. Where a stream has not too high a gradient, it has been in many places filled in up to the level of the adjoining *padi* fields so as to afford a slightly larger area of rice-growing land. Powerful *bandhs* of rock across the stream *nullah* are necessary where this is done, otherwise the subsoil flux rapidly washes away the earth-filling. While this lasts it certainly minimizes the dangers that lie in the streams. Except for this sort of thing, the conclusions reached above indicate for permanent control work the training of the hill streams, or better still the damming up of lines of drainage to form permanent reservoirs, such as are shown in figures 2 and 3.

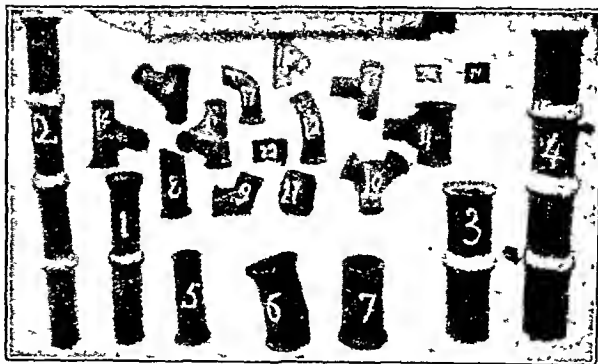


Fig. 4—The potter, helped by two coolies, turns out 200 pipes daily.

On land where selected communities are settled a comparatively low endemic-index may have serious consequences and therefore mention may be made here of the use of sub-soil drainage by the Rev. Father Turkenburg at St. Stanislaus College, Hazaribagh. He has written an account of the material and technique employed (1938) and figure 4 illustrates the pottery produced by his workmen at such
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A SIMPLE TECHNIQUE OF GIVING INTRAVENOUS QUININE WITH SALINE

By R. K. DE, L.M.F., D.T.M.

Assistant Medical Officer, Talap Tea Estate,
Talap P. O., Assam

IN tea-garden practice, we frequently encounter algid cases of malaria, both in adults

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a low cost that this system of drainage is here brought within reach of a much wider circle of people than those whom it has been used to protect.

Summary

The Chota Nagpur plateau is mildly malarious. The villages at the head of the ghats, and also those along them and at their foot are severely malarious.

As the climate on the plateau is optimal for malaria-genesis, it is surmised that it is the physical conditions of the terrain, particularly the equability in the flow of the gentle streams and the operations of natural foes of the mosquitoes, or deviation by domestic animals, that inhibit a too dangerous culicidigenesis. This consideration also applies to certain communities living beside big river-beds in Bengal and to the Chota Nagpur villages in which *bandhs* or reservoirs of water have been made.

The streams at the head of the ghats mostly dry up in the hot weather and therefore the hyperendemicity there is due to mosquito breeding in the autumn.

The streams at the foot of the ghats flow for longer periods, but this advantage to culicidigenesis is offset on the malaria account by the excessive heat of the plains during the hot weather inhibiting the development of the malaria parasite.

Malaria control should be mainly carried out by creating series of reservoirs along the courses of the malariagenic streams so as to drown the mosquito haunts. Fish ladders could be provided at the same time and so some economic advantage could be gained from the proposed measure.

Acknowledgment

The writer is much obliged to the Rev. Father Turkenburg at Hazaribagh for his help in enabling him to carry out his investigations as far as Hazaribagh was concerned.

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Turkenburg, G. S. (1938). Irrigation papers. *Our Field No. 5*, June. Privately printed.

and children. Every choleraic diarrhoea case that comes is looked upon with suspicion as to the possibility of the case being due to malaria. In such cases the microscope is the only thing that helps us in making a rapid diagnosis.

The technique.—When the case has been diagnosed as one of the choleraic type of malaria, saline infusion is begun, either by direct vein puncture or by opening a vein. Then I take in a syringe the desired amount of quinine dissolved in one or two cubic centimetres of distilled water and while the saline flows on, inject the quinine into the saline solution through the rubber tube that connects the saline funnel and the needle. The rubber tube is taken as a vein, sterilized with spirit and punctured. The quinine solution is given very slowly so that it is well diluted with saline, and this eliminates shock.

This method of giving intravenous quinine by injection into the rubber tube has the following advantages:—

(1) Most of the cases come so late that saline infusion has to be undertaken at once before anything can be done in the way of laboratory diagnosis. In such cases, I generally take a blood slide first and begin saline injection and, by the time it is prepared and the administration begun, the blood slide has been examined; if it is 'positive', the quinine is given by the above technique. Hence further puncture or opening of a vein is avoided.

(2) Exact amount of quinine can be given as desired or necessary. If the quinine is mixed up with saline, there is chance of loss of a certain percentage of quinine, as the whole quantity of saline taken for infusion may not be required and also some cases react badly after a few ounces of saline.

(3) The most important advantage is that quinine can be stopped at the slightest possible sign of quinine shock and any intravenous circulatory and respiratory stimulant can at once be given by this method. My procedure in bad cases of choleraic malaria is that I first give 0.5 to 1 c.cm. of adrenaline chloride by this method and then I give quinine. This prevents any possible occurrence of shock from quinine.

By this technique I do not deprecate the other valuable techniques nor do I claim something new, as it may be known to many. I send this note for publication because there may be some who will find some interest in it. Also I think that any technique, however simple and negligible it may be, should be recorded.

[Note.—We note what the writer says on this point, but we still consider that much the same result could be achieved by pouring the quinine into the tank with a small amount of saline and adding the rest of the saline when this is almost exhausted.—EDITOR, I. M. G.]

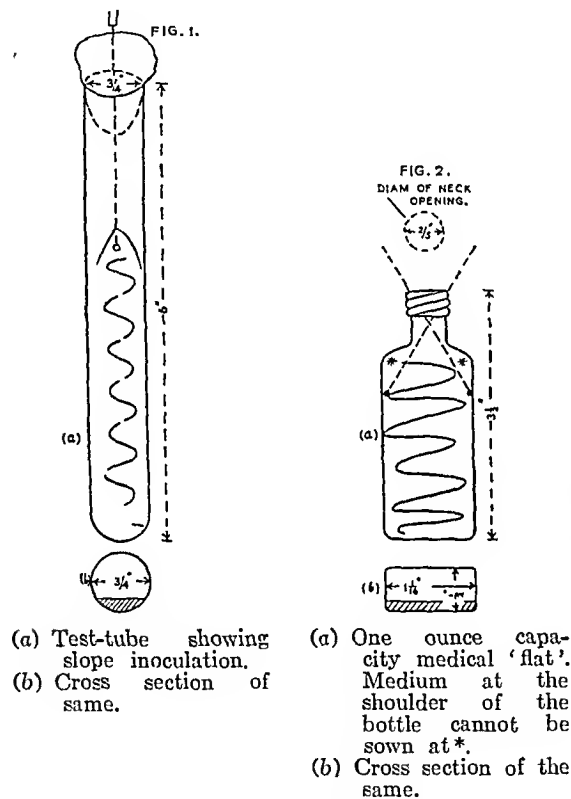
SUGGESTION FOR A NEW TYPE OF TUBE FOR BACTERIOLOGICAL CULTURES.

By T. V. SWAMY, M.B., B.S.

Assistant Lecturer, Pathology Department, Medical College, Rangoon

THE ordinary test-tubes as holders for solid culture media in bacteriological work have been in use fairly successfully now for a long time. McCartney suggested, as late as 1933, the ordinary screw-capped medical 'flat' as a more efficient substitute for the test-tube.

For the last two years, we have been using these 'flats' for cultural work both in this department and in the General Hospital



bacteriological laboratory and from this short experience, I consider there is scope for a further improvement in this type of container.

The usual 'flat' is made up of an oblong body and a narrow neck with the threads for fitting the metal cap. The disadvantages in this form of 'flat', to my mind, are that the neck is a little too narrow for utilizing the whole of the culturable surface when a loop spreader is used. This means a waste of a part of the medium. I believe, a larger bore of the neck would overcome this defect. Again, the corners of the oblong medical 'flat' being as they are abruptly angular prevent a good visibility of certain parts of the culture. This can be got over possibly by converting the angularities into two gradual curvatures on opposite sides of the main flat surfaces. This idea occurred to me

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THE USE OF THE DOMESTIC FOWL FOR THE PREPARATION OF DIAGNOSTIC ANTISERA

By C. L. PASRICHA

MAJOR, I.M.S.

M. N. LAHIRI

and

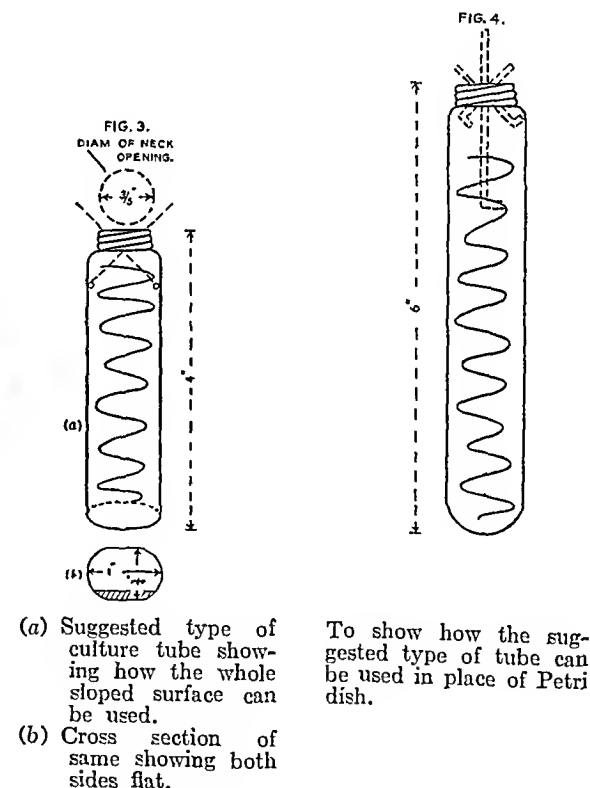
B. M. PAUL

(from the Department of Bacteriology and Pathology, School of Tropical Medicine, Calcutta)

THE domestic fowl is frequently used as a laboratory animal, but as far as we are aware it has not been used for the preparation of diagnostic sera. Owing to the difficulty in both

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after seeing a glass holder of a common make of tooth brush.



This container, if provided with a screw-cap end of a sufficient diameter, would make an ideal media holder. Indeed, a container of this kind could very well be used instead of the Petri dish which has some obvious disadvantages. Owing to the larger width of the mouth suggested, it would be possible to introduce through it the usual angular glass spreader for inoculation just as in a Petri dish.

The above diagrams with the explanatory foot-notes will clarify the advantages of the suggested modifications.

REFERENCE

McCartney, J. E. (1933). *Lancet*, ii, p. 433.

obtaining and maintaining in Calcutta an adequate stock of rabbits, the animal almost universally employed for raising high-titre sera, it was thought desirable to test the agglutino-genie response in fowls after the injection of the commonly-employed bacterial antigens. Medium-sized domestic fowls (weighing $1\frac{1}{4}$ to $1\frac{1}{2}$ pounds), which are obtainable in large numbers in the local markets, were used and the amount of antigen injected was half the amount usually injected into a rabbit. The intervals between injections and the number of injections were similar to those employed in a rabbit. Seven to ten days after the last injection the fowl is bled from the wing vein and 10 to 15 c.cm. of blood can be collected from the vein of a fowl without causing any appreciable harm to the bird. If desired the blood can be collected by heart puncture or the animal 'bled out'. Satisfactory high-titre sera were obtained for *Bacterium typhosum*, *Bact. shigæ*, *Bact. flexneri* and *Vibrio cholerae*. As an illustration the sera obtained after injections of dried 'O' antigens of standard Inaba and Ogawa vibrios were found to give the following agglutination results:—

The results of agglutination test with cholera high-titre sera raised in domestic fowls and in rabbits

Serum	AGGLUTINATION WITH <i>Vibrio cholerae</i>	
	Inaba type	Ogawa type
A. Fowl serum prepared with		
I. Inaba O ..	1,500 *	0
II. Ogawa O ..	0	2,500
B. Rabbit serum prepared with		
I. Inaba O ..	1,000 *	0
II. Ogawa O ..	0	2,500

* After absorption with Ogawa strain to obtain a differential serum.

0 = No agglutination in 1 in 100 dilution of the serum.

The domestic fowl is valuable in tests for potency of therapeutic vaccines. The amount of vaccine injected into each fowl is one-quarter of the total human dose recommended by the manufacturer and it is injected in a series of three graded doses at intervals of five days. The serum of each bird is examined for the presence of specific agglutinins before the inoculation of vaccine and again ten days after the last dose. If the antigenic response is poor further injections can be given to the same bird. In order to avoid the possibility of poor antigenic response due to inherent insusceptibility of any particular animal, it is advisable to use more than one animal.

The domestic fowl is not only readily available in large numbers in the local markets but

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THE VIABILITY OF *VIBRIO CHOLERA* IN NATURAL WATERS

By M. N. LAHIRI

P. C. DAS

and

K. S. MALIK

(From the Cholera Bacteriological Enquiry, Indian Research Fund Association, School of Tropical Medicine, Calcutta)

As water is one of the most important vehicles of infection in cholera, the viability of the cholera vibrio in natural waters has attracted the attention of a number of cholera workers. Workers who have examined the viability of *Vibrio cholerae* in water are agreed that whereas the vibrio can live for a short time in untreated natural waters, it survives for longer periods in samples that had been previously boiled. Hankin (1896) attributed the bactericidal effect to the acid reaction of the river waters. d'Herelle (1926) suggested that the disappearance of vibrios from natural waters was due to the presence of specific cholera phage present in these waters. Later, experimental data of d'Herelle, Malone and Lahiri (1930) did not support this opinion. These workers examined the viability of cholera vibrios in waters collected from various sources including one sample of hill water, and recorded a maximum viability of 48 hours except in one sample of well water in which agglutinable vibrios survived for three days. In view of the recent, more exact serological identification of the cholera vibrio using standard O-agglutinating sera, it was

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is cheaper than the rabbit. A medium-sized fowl costs about 7 annas (about 8 pence) each in Calcutta and about half that price up-country. The price of a medium-sized rabbit is four to five times the price of a fowl. A number of birds can be kept in a small fowl pen and their upkeep requires no elaborate arrangements such as are necessary in the maintenance of a healthy stock of rabbits.

The only difficulty experienced with these birds is that when a batch is purchased a certain number die, but, if the birds are used after having been kept under observation for about a fortnight, there is very little danger of losing experimental birds.

The birds are conveniently marked by fixing numbered rings on their legs.

An additional advantage of the use of these birds is that blood agar medium made with the blood of these birds supports the growth of such fastidious organism as *Neisseria meningitidis*. Sacrificed birds can be utilized for the preparation of digest broth (best made from the pounded bones and muscle), and any eggs laid in the fowl-run are incubated and subsequently used for virus work.

thought desirable to retest the viability of standard strains of vibrios in natural waters.

The samples of water were collected from surface tanks situated in certain parts of Calcutta where the disease is most prevalent, from the river Hooghly and from certain other sources. Four litres of water were collected from each source in a sterile stoppered bottle. Each sample of water was arranged in four flasks:— (a) raw untreated, (b) raw and autoclaved, (c) filtered through L³ candle, and (d) filtered through L³ candle and autoclaved. A saline suspension (from a young agar growth) containing approximately 1,000 millions of a freshly-isolated cholera vibrio (Inaba type) was added to each flask. The flasks were kept in a cupboard at room temperature and were examined every hour for the first six hours and then every 24 hours until vibrios were no longer recovered from the sample. A sample was considered to be free from vibrios when three successive examinations (using 100 c.cm. of the water as the inoculum) yielded negative results. The isolation of vibrios was carried out on bile-salt agar plates and on Aronson's medium after enhancement in peptone water. Vibrios were not present in uninoculated samples of these

used in the test were not found in any of the samples tested.

TABLE I

The viability of V. cholerae in samples of water from specified sources

Source of water	RAW		FILTERED THROUGH L ³ CANDLE	
	Untreated	Auto-claved	Raw	Auto-claved
Hill (spring) water.	1 hr.	18 hrs.	Not done	Not done
Calcutta tap water.	18 hrs.	24 "	2 days	12 days
Hooghly river	18 "	3 days	2 "	2 "
Dalhousie sq. tank.	48 "	3 "	7 "	15 "
Narkeldanga tank.	72 "	12 "	7 "	18 "
Ultadanga tank	72 "	12 "	7 "	18 "

The samples of water from different sources were examined for the reaction, hardness, dissolved solids, oxidizable organic matter and the chloride content. The results of a representative series is given in table II.

TABLE II

The results of the chemical examination of different samples of water, before and after autoclaving

Source of water	pH		CHLORIDES (MORRIS' * METHOD)		DISSOLVED SOLIDS *		OXIDIZABLE ORGANIC MATTER		TOTAL HARDNESS, DEGREES	
	Raw	Auto-claved	Raw	Auto-claved	Raw	Auto-claved	Raw	Auto-claved	Raw	Auto-claved
Hill (spring) water ..	7.7	9.1	0.25	0.30	13.6	13.6	0.096	0.134	6.0	6.0
Tap water ..	8.2	8.7	0.75	0.75	26.4	18.0	0.082	0.086	22.0	16.0
Ganges river ..	7.9	8.1	1.3	1.44	26.4	16.0	0.23	0.42	17.5	9.5
Dalhousie sq. tank ..	8.7	9.3	21.4	21.6	54.2	53.2	0.25	0.48	16.0	15.0
Narkeldanga tank ..	8.5	9.1	23.1	23.6	93.5	89.6	0.72	0.84	20.0	14.0
Ultadanga tank ..	8.3	9.0	30.8	31.0	113.8	107.4	0.72	0.76	34.0	23.0

* Results are expressed as grams per 100,000 c.c. of water.

waters. Twelve samples from each source were examined and the average viability of *V. cholerae* in these waters is shown in table I. Bacteriophages active against the strain of *V. cholerae*

Waters raw and autoclaved, were examined for the amount of free and albuminoid ammonia in them. The type of results obtained are given in table III.

TABLE III

Free and albuminoid ammonia content of raw and autoclaved waters. The results are expressed as milligrams of nitrogen per 100,000 c.cm. of water

	GANGES		DALHOUSIE		ULTADANGA		NARKELDANGA	
	Free	Albuminoid	Free	Albuminoid	Free	Albuminoid	Free	Albuminoid
Raw sample ..	7	9	13	42	526	255	38	136
Autoclaved sample	9	14	14	48	356	362	91	297

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A PRELIMINARY REPORT ON THE MEDICO-LEGAL VALUE OF THE FINDING OF BLOOD ON NAIL PARINGS

By D. P. LAMBERT, M.D., D.T.M. & H. (Univ. Edin.)

MAJOR, I.M.S.

Civil Surgeon, Meerut

GIVING evidence recently before the Lahore High Court, the chemical examiner for the Punjab stated that in his opinion the finding of human blood on the nail parings of an accused person had 'Absolutely no medico-legal value whatsoever'. In support of this opinion he gave a short list of some possible sources of

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The results (table III) show that there is an increase in the albuminoid nitrogen content of the water when the sample of water is autoclaved. It is suggested that this increase of nitrogen is due to the hydrolysis of the finely suspended organic matter in the water. There is an increase in autoclaved water in the food material available for the growth of vibrios.

It will be seen that *Vibrio cholerae* does not survive long in natural waters. In spring water it dies out in less than two hours and its longest duration in untreated natural waters is 72 hours. In autoclaved samples the viability is considerably increased.

In natural waters that have been rendered bacteria free by filtration through a Pasteur-Chamberland candle, the viability is increased and when such a sample is autoclaved the vibrio is capable of surviving for a longer period.

Conclusions and Summary

(1) The viability of a freshly isolated strain of *V. cholerae* in natural waters has been examined.

(2) The viability of *V. cholerae* in samples of waters that had not been treated in any way was found to vary from one hour in samples of hill water to 72 hours in water collected from certain tanks. These tank waters were found to contain a considerable amount of organic matter and to have a high salt content.

(3) The viability of *V. cholerae* is considerably increased in autoclaved samples. It is suggested that the increase in viability is due partly to the increase in the available food supply in the autoclaved water which results from the break-down of the suspended organic matter.

(4) Choleraphage was not found in any of the samples of water tested.

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innocent contamination, and implied that such contamination was so usual as to be almost a normal finding. He also stated that it was 'most unlikely' that blood could be detected on the nail parings of a man accustomed to wash regularly, twenty-seven days after his hands had been stained by blood [The *Statesman* (Northern India Edition), 28th November, 1938, p. 14]. After hearing this evidence the High Court ruled that 'An end will now be put to nail paring evidence in this Province'.

In view of this ruling it seemed important to verify these statements by experiment. After testing the sensitivity of the reagents, I examined the nail parings of forty under-trial prisoners and of twenty convicted prisoners from Meerut District Jail. The parings were taken by the jail barber using his ordinary instruments and without any special precautions against contamination. Of the 600 separate nail parings so obtained three gave a positive reaction, and six gave a positive trace with the benzidine test. The remaining 591 were all negative. These specimens were received in bulk, so it is impossible to say whether the positively reacting nails all came from one person or from nine separate persons.

The benzidine test which was used throughout these experiments is very sensitive, but it is not a specific test for blood. If blood is present the test will detect it, even in extreme dilution, but a positive reaction is not a certain proof of the presence of blood, still less of human blood. These limitations of the test should be constantly borne in mind in interpreting the results.

The nails of ten hospital patients who had either open wounds or a free discharge of blood from some part of the body were next examined. It was impossible to be certain that these men had had their nails contaminated with blood, but it seemed very likely. The parings were made with ordinary hospital scissors, clean but not specially cleaned, and no unusual precautions were taken in cutting. The results of examining these nails are shown in the table below.

Compared with the results of the jail series the difference is striking. Some light is also thrown on the period up to which blood may persist beneath the nails. Assuming that no gross contamination took place after admission to hospital, blood persisted under the nails of these persons for an average period of 24 days, with a maximum period, disregarding traces, of 35 days. All these patients washed regularly, but none used soap, nail-brush, or any refinement of manicure.

As a control series I examined the nails of the remaining 24 hospital patients. Twelve sets of nail parings were completely negative. Eight sets showed a positive trace on one nail only. One set showed two positive traces. Of the remaining three patients one gave one positive reaction and one a trace. This man had

persistently tampered with his dressings after operation. The second gave two entirely unexplained positive reactions; and the third, who had had one nail cut to the quick on paring, gave a strongly positive reaction on that nail and a positive trace on the next. These results too contrast with those of the first group,

that a person may contaminate his nails with his own blood in many ways; but contamination with blood of a group other than his own would require a great deal more explanation. In this type of investigation blood grouping should never be omitted; otherwise valuable evidence may be lost.

TABLE

Case number	Source of bleeding	Days since admission to hospital	RESULTS OF THE BENZIDINE TEST		
			Strongly positive	Positive	Trace
1	Open wound	14	..	3	4
2	Bleeding ulcer	22	..	2	..
3	Bleeding dysentery	1	..	6	..
4	Open wound	1	1	5	..
5	Bleeding ulcer	39	..	..	2
6	Open wound	91	..	..	1
7	Open wound	9	..	2	5
8	Open wound	7	1	2	7
9	Open wound	35	..	3	2
10	Hæmoptysis	24	..	4	2

particularly if traces are disregarded. If contamination with blood is likely to occur anywhere it is likely to occur in an Indian District Hospital, and the results suggest that accidental contamination is not likely to amount to more than a trace, and that only on one or two nails.

Another experiment was made to find out the extent to which blood-stained scissors were likely to contaminate the nails they pared. Hospital scissors were smeared with blood and the blood was allowed to dry on. The scissors were then roughly washed and mopped dry. They were not polished or specially cleaned. After this treatment the scissors themselves gave a positive trace reaction, but nails cut with these scissors remained negative. This experiment was repeated several times with consistent results. If ordinarily clean scissors are used, and reasonable care taken in paring, it seems unlikely that serious contamination can arise from this source.

In his statement before the High Court, the chemical examiner made no reference to the subject of blood grouping. It is conceivable

I would re-emphasize the preliminary nature of these experiments, and again draw attention to the limitations of the benzidine test; but they strongly suggest that contamination of the nails with blood is neither a common nor a usual finding, and that every contamination of many nails is only likely to occur by contact with shed blood. The finding of blood on an accused's nail parings is certainly not conclusive evidence of guilt; but it is equally unscientific to say that such evidence is of no value whatsoever. The court will decide in each case what weight the scientific evidence will have.

It is very desirable that this subject should be re-investigated on a larger scale, using spectroscopic and precipitin methods. The ideal place for such a research would be a well-equipped medico-legal institute, the want of which provision greatly handicaps the administration of justice in India.

I have pleasure in acknowledging the courtesy of the Inspector-General of Civil Hospitals, U. P., and the Chief Justice of the High Court, Lahore, in permitting me to publish this paper.

A Mirror of Hospital Practice

ACUTE MEDIASTINAL EMPHYSEMA WITH GENERALIZED EMPHYSEMA

By F. A. B. SHEPPARD, F.R.C.S. (Edin.)

CAPTAIN, I.M.S.

District Medical Officer, Madura

ACUTE mediastinal emphysema is probably a common sequel to severe crushing injuries of the chest, but as it is frequently complicated by

other intra-thoracic damage it is not often that such cases are presented for treatment. In itself the condition calls for urgent surgical intervention as with each breath taken more air is forced into the relatively closed and restricted space of the mediastinum. As the blood returns to the heart from the lungs and the systemic circulation bears the brunt of the compression it is not surprising that signs of cardiac failure

and respiratory distress soon become obvious. To these effects are added, of course, those of surgical shock. If allowed to persist for any time the pressure of air in the mediastinum may burst through one or both pleural cavities with the production of a tension pneumothorax. It is of course always possible that with any severe crush of the chest, both a mediastinal emphysema and a tension pneumothorax may occur simultaneously, the symptoms then being correspondingly severe. Sauerbruch (Sauerbruch and O'Shaughnessy, 1937) states that the accident may also follow attempts at artificial pneumothorax where the needle has been inadvertently introduced into a portion of the lung adherent to the chest wall.

In the case reported below, it is interesting to observe that the injury appears to have given rise to a valvular defect in one of the root bronchi or in the lower trachea, with the result that while air was satisfactorily inspired, there was considerable escape into the tissues on expiration.

Simple opening of the space of Burns, as usually advised, cannot suffice since the deeper layer of fascia attached to the posterior surface of the manubrium sterni must be opened for adequate decompression of the mediastinum to occur.

Notes of case recorded

N., Hindu, aged 4 years, the son of a coolie, was admitted to hospital at 6.45 p.m. on 6th December, 1937, with a history of having been run over by a partially-loaded double bullock cart five hours before. Although it is difficult to believe that such an accident could occur without killing the child the parents persisted in the statement that the child had been climbing up the wheel of the cart, when the bullocks started to move, that he fell down and the right wheel had passed over his chest.

On examination the child was restless and in a desperate condition, with short rapid and grunting respirations. The whole body with the exception of the lower limbs was so extremely emphysematous that the bones of the chest and skull could not be clearly felt. The skin was shining except for the face and neck which were somewhat cyanotic and the eyes could not be seen because of the emphysema. The scrotum was enormously ballooned. There was an abrasion of the skin across the right half of the chest at the nipple line, but it was not possible to determine any fracture of ribs or sternum.

Respirations were 60 to the minute and the pulse could not be felt at the wrist. On auscultation, the heart did not appear to be displaced but the beat was extremely rapid. It was not possible to ascertain whether air was entering both lungs. The child's condition was so grave that examination was necessarily very hasty and no time could be lost by taking an x-ray picture.

Operation.—To exclude the presence of tension pneumothorax both pleural spaces were punctured with a pneumothorax needle. The pressure was negative on each side.

The root of the neck was then infiltrated with 0.5 per cent novocain and a low collar incision was made through skin, platysma and deep fascia. The sternomastoid attachments were defined and the mediastinum opened by finger dissection behind the manubrium sterni. The result was dramatic. Air immediately gushed out and was seen to escape with each expiration. Hæmostasis was secured and the wound was loosely covered with gauze. The effect on

the child was no less dramatic and he became calm and quiet and soon fell asleep. The extremities were wrapped in cotton-wool and bandaged and the child returned to the ward.

An x-ray photograph, taken immediately after the operation, revealed simple fracture of the second and third right ribs.

The generalized emphysema diminished considerably by 10th December, but did not completely subside until after another few days.

Air continued to escape from the wound for four days. The wound was allowed to close by granulation and the child was discharged cured on 19th January, 1938.

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AN UNUSUAL CASE OF CUTANEOUS AMOEBIC ULCERATION AROUND THE ANUS

By R. V. RAJAM, M.B., M.S., M.R.C.P.

Venereal Specialist, General Hospital, Madras
and

P. N. RANGIAH, M.B., B.S.

Honorary Assistant Medical Officer, Venereal
Department, General Hospital, Madras

CRAIG (1934), quoting James' figures, points out in his treatise on amœbiasis and amœbic dysentery that 10 per cent of hospital cases in India, examined for *Entamoeba histolytica*, were positive for the tissue parasite. Despite such a common incidence of the infestation and the well-established fact of the parasite being a tissue invader, it is surprising how few cases of cutaneous amœbiasis occur or are recorded in current literature.

Modern textbooks on tropical diseases describe at length amœbic hepatitis and other complications of amœbic dysentery such as brain abscess and pulmonary amœbiasis; but cutaneous amœbiasis, particularly around the anus, has found little emphasis.

According to Craig, lesions of the skin produced by *Entamoeba histolytica* have been reported by Nasse, Carini, Daghorn and Heyman, Heyman and Ricon, Engman and Heithaus, Heimburger, van Hoof, Cole and Heidman, Engman and Meleney, Kouri, Bolanos and Fuentes and Ngai and Frazier.

Manson-Bahr (1938) reported a case of amœbic ulceration round a colostomy wound.

The latest case reported was by Gabriel (1939) in which it appears no amœbæ or cysts were demonstrated in the scrapings from the ulcers or colostomy wound.

Engman and Meleney reviewing the ætiology of cutaneous amœbiasis showed that skin ulceration may occur :—

- (i) About the anus in cases of amœbic colitis or dysentery.
- (ii) Subsequent to drainage of an amœbic abscess of the liver.
- (iii) Drainage of a lesion of the appendix or of the large intestine, or

(iv) without any direct connection with the viscera.

The comparative rarity of this complication of amœbiasis and the ease with which the condition may be mistaken for ano-rectal lymphopathia venereum prompt us to report this case.



Fig 1—Lower Power—Note the numerous amœbæ surrounded by granulation tissue

The patient, a male, aged 40 years, came to the General Hospital on 15th August, 1938, complaining of passing blood and mucus per rectum and ulceration around the anus for about six months. As he gave a history of having suffered from bilateral bubo, he was referred to the venereal department as a case of suspected ano-rectal lymphopathia venereum.

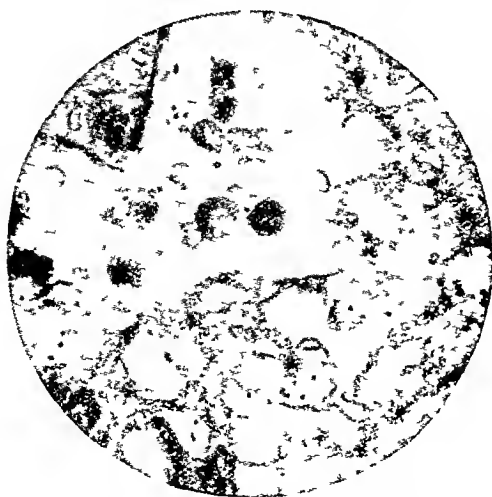


Fig. 2—The same field but under the high power showing the amœbæ

Physical examination revealed no active lesion on the genitalia but there were scars of past buboes in both groins. There was extensive chronic indolent perianal ulceration with irregularly radiating indurated scars almost obliterating the anal orifice. Digital examination showed a tight stricture of the anal orifice and with difficulty the finger could be passed through the stricture. The mucous membrane of the rectum appeared normal to the feel except that the examining finger was stained with blood and mucus. A sigmoidoscopic examination was refused. Barium enema did

not reveal any stricture further up the rectum and colon.

In view of the past history of bilateral bubo and the present clinical condition a Froe's intradermal test was performed with negative result. A section from the ulcer was sent to the pathologist, Medical College, and the report was as follows:—

'Section shows ulceration and necrosis of the stratified epithelium with evidence of chronic inflammation. In the neighbourhood of the ulcer are seen numerous amœbæ.'

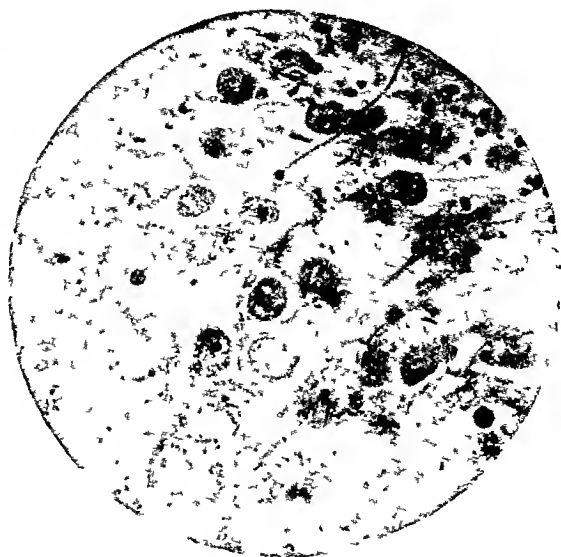


Fig 3—Photomicrograph showing numerous *E. histolytica* with nuclei in them; a few show red cells within (1/12th power).



Fig 4—Photograph showing ulceration around the anus.

The smear from the rectum also showed a large number of *Entamoeba histolytica*. The patient was treated for amœbiasis with a course of emetine hydrochloride injections followed by emetine bismuth iodide orally.

The ulceration rapidly healed and the discharge of pus and blood from the rectum ceased. A colostomy was suggested for the tight stricture but was refused. The patient could not be followed up as he defaulted owing to fear of operation.

We are thankful to the Professor of Pathology and his staff for the pathological report and photomicrographs; and to the Superintendent, Barnard Institute of Radiology, and his staff for the clinical photograph.

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CEREBRO-SPINAL FLUID FINDINGS IN A CASE OF MENINGOCOCCAL MENINGITIS

By M. G. PRADHAN, Ph.D. (Lond.), D.T.M. & H. (Eng.)
Honorary Bacteriologist, Goculdas Tejpal Hospital, Bombay

THE examination of a sample of cerebro-spinal fluid gave the following results:—

General examination (naked eye).—

Appearance	..	Opalescent.
Deposit	..	Absent.
Coagulum	..	A fine fibrinous coagulum present after two hours.

Chemical examination.—

Total proteins	..	Increased (qualitative).
Globulin	..	Pandy's test—positive. Nonne-Apelt phase I—positive.
Sugar	..	Present, diminished (qualitative).
Chlorides	..	730 mgm. per 100 c.cm.

Cytological examination.—

Total number of cells.	220 per c.mm.
Differential count	Polymorphs.—40 per cent. Mononuclears.—60 per cent.

Bacteriological examination (centrifuged deposit examined stained).—

Gram's stain	..	No micro-organisms seen in smears.
Ziehl-Neelsen stain	..	No acid-fast bacilli found even after prolonged search.

(The fluid was incubated at 37°C. for 12 hours, and centrifuged deposit was again examined for micro-organisms.)

Gram's stain .. Gram-negative diplococci present.

The deposit was plated on ascitic agar and a pure culture of meningococci was obtained.

Levinson's differential test.—

Levinson's differential precipitation test gave a positive result for tuberculous meningitis.

Comments.—In the absence of a direct demonstration of the infecting micro-organism in the smears made from the centrifuged deposit of the fluid, other findings such as the number and the type of cells, presence or absence of sugar, and the quantitative estimation of chlorides help to determine the diagnosis in a case of meningitis.

Thus we say that meningococcal meningitis gives rise to increased polymorphonuclear cells and tuberculous meningitis to increased lymphocytes. This, however, seems to depend entirely on the intensity of the stimulus given by the infecting micro-organism and the stage of the disease at which the fluid is obtained. Thus if a case of meningococcal meningitis is seen early enough, before the infecting organism has multiplied sufficiently to cause a polymorphonuclear response, one may, as in the present case, find a predominance of lymphocytes. (The fluid in the present case was obtained on the very first day when the patient complained of fever and headache). Alternatively, I have seen a pure polymorphonuclear exudate in a case of tuberculous meningitis following acute miliary tuberculosis. Similarly the character of the coagulum also will depend upon the number of cells and the amount of fibrin present in the fluid.

In this case the quantitative estimation of chlorides alone helped diagnosis, and treatment for meningococcal meningitis was instituted on the strength of the chloride finding alone, without waiting for further bacteriological examination. An examination of the patient's blood film revealed a polymorphonuclear leucocytosis.

Subsequently, on incubation and further culture, meningococcus was obtained from the fluid. The patient also made a remarkable recovery on specific antiserum combined with M. & B. 693.

Levinson's differential precipitation test was done out of academic interest and to my surprise it was found positive for tuberculous meningitis. The reaction is said to depend on the electrical charge of the exudate which is different for meningococcal and tuberculous meningitis, which gives rise to different quantities of precipitates. Here too it may be pointed out that the electrical charge, the type, and the amount of precipitate will depend entirely on the type of cells forming the exudate. On this account it is suggested that the test is no more specific than the differential count of the fluid.

A CASE OF UNTREATED TRAUMATIC SPONDYLOLISTHESIS OF THE THIRD CERVICAL VERTEBRA

By M. G. KINI, M.C., M.B., M.Ch. (Orth.), F.R.C.S.E.
Surgeon

and

P. KESAVASWAMI
Radiologist

King George Hospital, Vizagapatam (S. India)

FRACTURES and dislocations of cervical vertebrae have been recognized since the earliest history of medicine. The first authentic description of this kind of injury was found in the Edwin-Smith Papyrus (1600 B.C.). Hippocrates described this condition and advocated treatment by extension in the recumbent position. Later writers described these injuries and were

of opinion that they were always serious and ended fatally. Henry Cline (1814) was the first to advocate operative interference in cases of this fracture. With the advent of radiography the treatment of this condition has changed; the closed method of reduction with good result is practised by extension, manipulation and fixation. Operative interference is advocated in cases which have come late, without any treatment, for relief of pain.

A male, aged 45 years, was seen in the out-patient department in 1935 for stiffness of the neck of nine months' duration. He gave a history that he fell on his neck losing his balance while rocking in a chair, hitting his head against the door sill. He was unconscious for half an hour. He had no control over his upper and lower limbs for 20 days. For 40 days he could not move his head. He did not give a clear history of his bladder or rectum control but said he had had no trouble from the time of the accident.



Fig. 1.

Fig. 2.

Photographs showing the deformity.

On examination, movements at the atlanto-occipital and atlanto-axial joints were found to be normal.



Fig. 3.—X-ray picture showing the dislocation of the body of the 3rd cervical vertebra forwards with the lamina remaining *in situ*.

Forward flexion was possible without pain and the chin touched the sternum. Extension was limited and painful. Lateral flexion was possible but limited. Marked prominence of the spine of the third cervical vertebra was seen. There were no radiating pains along the course of any of the cervical nerves, no weakness of the muscles of the extremities, and sensation in upper limbs was normal. In the lower limbs epicritic sensation was lost on the dorsum of the feet over the metatarsals, knee jerk was exaggerated on left side and Babinski reflex was flexor in response in both feet. He had normal control over

bladder and rectum. X-rays showed forward dislocation of the third cervical vertebra with fracture of the lamina from the body.

This patient is a Sadhu and wanders from place to place and refused any type of surgical

interference for fixing the spine. But the following points are noteworthy :—

Fracture-dislocations of the third cervical vertebra are generally considered serious because of the paralysis of the diaphragm which is associated with this fracture-dislocation. More than 75 per cent of cases are supposed to die from respiratory failure and hypostatic pneumonia or later from bladder and kidney infection and bed sores. The injury occurred as a result of over-flexion of the neck as a result of a fall from a rocking chair when it rocked back too far. He complains of nothing except slight rigidity.

The non-involvement of the cord in this region is surprising in spite of the fact it is a fracture-dislocation. This is explained by the x-ray which shows the body had slipped forward and the lamina had remained *in situ*, a case resembling spondylolisthesis due to trauma.

A CLAY TRUSS FOR INGUINAL HERNIA

By RAI BAHADUR CHHAGAN NATH

Assistant Surgeon, Medical Officer, In-charge
Lansdowne Hospital, Udaipur

A PATIENT from a rural area, aged 45, was admitted for right inguinal hernia. He had been suffering from this for many years, and to minimize his disability he made himself a truss. The truss was a rectangular



block about 6 inches long and 3 inches wide made of clay, with holes in the corners, and in the centre of the block was a peg about an inch long. He used to introduce this peg into the inguinal ring and tie the truss on by a string run through the holes and round his hips and he was able to perform his ordinary work.

The patient was operated on and left the hospital cured, leaving the truss with us.

TREATMENT OF TWO CASES OF ACUTE MENINGITIS (PNEUMOCOCCAL INFECTION) BY M. & B. 693

By MEHR SINGH CHAWLA, L.M.P.
Borstal Institution, Lahore

THE following two cases of acute pneumococcal meningitis which were treated successfully by the use of M. & B. 693 are recorded on account of their immense significance, as pneumococcal meningitis has heretofore been almost always fatal.

1. The first case was a boy aged 14 years residing in a densely populated area of Lahore. On the morning of 12th February last after severe headache and vomiting he developed acute cerebral symptoms in the form of a fit resembling an epileptic fit accompanied by rise of temperature to 103.4°F. The case was first considered to be cerebral malaria and was treated with atabrin on that day. But the symptoms persisted and the patient was restless during the night. On the next morning he had severe convulsions like those of the previous day and his neck was noticed to be retracted while the limbs and trunk were rigid. Kernig's sign was present. The patient was delirious and the temperature remained at 103.2°F. Lumbar puncture was done and the fluid was found to be turbid and under pressure. The fluid was examined by the bacteriologist to the Mayo Hospital and revealed the presence of many Gram-positive diplococci morphologically indistinguishable from pneumococci and also many pus cells. The treatment with M. & B. 693 was commenced at once, i.e., on 13th February at 11-0 a.m. Three tablets of M. & B. 693 were given by mouth along with an intramuscular injection 2.5 c.cm. of M. & B. 693 emulsion.

On the same day at 5-0 p.m. three more tablets of M. & B. 693 were given. On the 14th, 15th and 16th of February, two tablets were given *t.d.s.* along with one intramuscular injection of 2.5 c.cm. M. & B. 693 emulsion each day.

From 17th to 20th February only two tablets of M. & B. 693 were given *b.d.s.* each day.

Altogether four intramuscular injections of M. & B. 693 emulsion along with 40 tablets of M. & B. 693 were given.

The acute brain symptoms delirium and restlessness disappeared on the 15th February and the temperature began to come down by lysis. The cerebro-spinal fluid examined on 16th February did not show any organisms though it contained a few pus cells. The patient made a slow recovery and was given general tonics which brought him to the normal condition in about two months' time.

2. The second case was that of an inmate of the Borstal Institution, a young man of about 20 years of age. On the evening of 5th April last, he had fever 102.8°F., with severe headache and vomiting. Head was retracted and the patient was delirious and semi-conscious. Limbs were rigid and Kernig's sign was present. Lumbar puncture was done at once and the fluid drawn was found to be turbid and came out under a fair pressure. The fluid, examined next morning, showed many Gram-positive diplococci and pus cells along with increase of protein and absence of sugar. A culture did not show any growth, probably on account of late inoculation of the fluid into the media (16 hours after its withdrawal from the spine). The patient was at once given 4 tablets of M. & B. 693 along with intramuscular injection of solution 5 c.cm. of prontosil 5 per cent. After six hours four more tablets of M. & B. 693 were given. The next morning

the temperature of the patient came down to 99°F., and in the evening it went again up to 102°F. The acute cerebral symptoms also subsided though there was a slight rigidity of the body. On 6th and 7th of April, three tablets of M. & B. 693 *t.d.s.* along with one intramuscular injection of prontosil 5 c.cm. were given each day. From 8th to 12th April, only one tablet of M. & B. 693 was given *b.d.s.* by mouth and the treatment was discontinued after that. Altogether 36 tablets of M. & B. 693 and three intramuscular injections of prontosil (5 c.cm. of a 5 per cent solution) were given.

The patient's temperature was normal on the 10th day of the attack and he made an uneventful recovery.

In neither of these cases was an acute focus of pneumococcal infection observed in the lungs, throat, or ears, hence the presumption is that the infection in the meninges was a primary one.

In both these cases the blood count was made after 8 days of treatment with M. & B. 693 and no leucopenia was noticed, which is sometimes observed after its administration.

Acknowledgments

I am much indebted to Colonel G. A. Khan, I.M.S., for the facilities afforded to me and also for his permission to publish these case notes. Also I wish to express my thanks to Major Taylor, I.M.S., and to Dr. Raghbir Singh of the Mayo Hospital who took special interest in the first case, and I am thankful to Dr. Man Mohan Singh and Dr. Nand Lal of the King Edward Medical College Pathological Department, for giving me their assistance in the second case.

ACUTE TONSILLITIS TREATED WITH SOLUSEPTASINE

By J. C. BHATTACHARJEE, L.M.P.
Darjeeling Himalayan Railway Hospital, Siliguri

THE patient was a female aged about 60 years.

History.—She felt pain in the throat the previous day and had had no sleep at night. The condition became aggravated so quickly that by the morning she was unable to swallow and any attempt at swallowing even water was followed by ejaculation through the nostrils. She had a rise of temperature since the start of the pain.

On examination the patient could hardly open her mouth and examination of throat, done with much difficulty, revealed both tonsils inflamed and enlarged to such an extent as to overlap each other causing occlusion of the throat. The right one was bigger than the left, but both were covered by scattered white patches.

The patient was advised hot application externally and was given 10 c.cm. of 10 per cent soluseptasine (May and Baker) intramuscularly.

The next morning, the condition was the same and another 10 c.cm. of soluseptasine was injected. In the evening the temperature came down and the patient was able to take sips of glucose water occasionally.

The patient was much better the next morning, when she was able to open her mouth to some extent. As she could swallow liquid, she was given two tablets of proseptasine (May and Baker) (1.0 gm.) crushed and emulsified in water to be taken three times a day; this was continued two days more and her recovery was uneventful.

Indian Medical Gazette

DECEMBER

THE ÆTIOLOGY OF EPIDEMIC DROPSY

DURING the last two years a distinct advance has been made towards the solution of the ætiology of epidemic dropsy, though the controversy, on this problem, which has enlivened these columns at short intervals throughout the last sixty years, is not yet closed. We can probably look forward to much further discussion before the exact cause of this disease is finally settled, if in a matter of this kind there is such a thing as finality.

The theories that have been put forward can be grouped as follows:—(i) That it is caused by an infecting organism, a bacterium or a virus, that can be passed from person to person; (ii) that it is an intoxication acquired from (a) diseased rice, (b) mustard oil, or (c) some other source; or (iii) that it is a food-deficiency disease. Whilst the infection theory has had advocates from time to time, it has never claimed a large following, and nearly all epidemiological and experimental evidence is directly opposed to this mode of origin. The other theories are all associated with food, with errors of omission or commission in dietary, and it is mainly around this that the hypotheses of the last century have circled.

Rice has nearly always occupied the centre of the picture; it is natural that it should, as the communities affected are all rice-eating communities, but little progress was made with the identification of the noxious factor in rice, and most of the theories put forward were backed by scanty and often equivocal experimental data. Whilst broad epidemiological observations (e.g., that the disease is for all practical considerations confined entirely to rice-eating people), and a number of amateur enquiries supported the rice-toxin theory, no expert epidemiological investigation of a specific outbreak had been carried out, and in our editorial columns in September 1935 we commented:—

‘The epidemiological investigations must be raised from the anecdotal to the scientific level. The population subjected to enquiries must be a large one and only selected on a geographical, not on an economic, social or religious, basis; the enquiries must be made amongst those who have not, as well as those who have, suffered from the disease; the mild cases of the disease must also be taken into account and this presents difficulties as it means that a careful medical examination of the whole population at the time of the outbreak is necessary; histories taken at a later date may be misleading. Very few

investigations of this nature have been undertaken, but it is only through such investigations that we are likely to reach a solution of the problem.’

Such an expert epidemiological investigation was undertaken by Dr. R. B. Lal, the officiating director of the All-India Institute of Hygiene, and other members of the staff of that institution, in six different areas, in Bengal, Bihar, and Assam, including a tea estate, where an outbreak of the disease had been recognized and reported by Dr. Charles Terrell. These investigations appeared to point once more to mustard oil as the probable vehicle of the noxious factor, and the same workers were able to produce suggestive symptoms in volunteers fed on samples of mustard oil that had come under suspicion in epidemic dropsy outbreaks. A search through the literature bearing on the mustard-oil theory brought to light a paper by Sarkar (1926), who recorded the production of symptoms resembling epidemic dropsy in man after the consumption of oil which had been accidentally adulterated with argemone oil. Argemone oil (local name, *sialkata* or *katakar* oil) is the oil expressed from the seeds of a plant *Argemone mexicana* which often grows wild in mustard fields. The seeds of this plant bear a superficial resemblance to the black variety of mustard seed and the oil expressed from them resembles mustard oil. Another paper (Kamath, 1928) described an outbreak in Ganjam district amongst people who do not use mustard oil. In this outbreak oil pressed from certain seeds locally known as *odissimari* was implicated. These seeds were identified later (*I. M. G.*, 74, 193) and found to be the seeds of *Argemone mexicana*.

Little notice was taken of these two papers at the time, but they form good examples of how isolated, and apparently irrelevant, observations are sometimes the key pieces necessary to complete the picture; in the second of these papers the writer's main theme was the support which his observations gave to the infection theory, but Dr. Sarkar was definitely of the opinion that it was the contaminating *katakar* oil which produced a syndrome closely resembling epidemic dropsy; for this reason we are reproducing his paper *in extenso* below.

The presence of argemone oil in mustard oil can be readily demonstrated by a simple colour change following the addition of nitric acid to the suspected oil and it was found that a positive reaction for argemone oil was obtained in the oils implicated in outbreaks of the natural disease. There was sufficient epidemiological data to justify a practical test of the hypothesis advanced by Sarkar in 1926 and this test was made early this year by Colonel Chopra, Major Pasricha and others at the School of Tropical Medicine, who showed by feeding experiments in man that the oil expressed from the seeds of *Argemone mexicana* led to the development of signs and symptoms of epidemic dropsy. Further experimental work in this

institution has shown that this oil is toxic to laboratory animals, but that, when mustard oil containing the adulterant oil is heated till it fumes, it is not so toxic. This is important, particularly in view of the custom prevalent in Bengal of using raw unheated oil in food and for anointing the body.

We have now arrived at the position in which mustard oil has been incriminated once more, but on this occasion the case against it rests on a much sounder basis of epidemiological and experimental evidence; argemone oil, a common adulterant of mustard oil, has been shown to produce symptoms identical with those of epidemic dropsy, whether it is administered accidentally or experimentally; and finally in a number of recent outbreaks it has been found that the mustard oil used by the victims was badly contaminated with argemone oil and that when its use was discontinued the outbreak subsided. Thus, taking the most optimistic view—though in practice things do not always work out quite as satisfactorily as one is led to hope—we may consider the case from the public-health point of view complete; and as there is a simple test for detecting the presence of argemone oil in any sample of mustard oil, it should be possible, by education and if necessary legislation, to prevent the sale and use of argemone-contaminated mustard oil, and to reduce epidemic dropsy from the status of a major public-health problem to that of an interesting pathological curiosity.

So much for the public-health point of view, but from the scientific point of view the position is not so satisfactory; we know that argemone oil contains a toxic agent but we do not know its nature or how it acts, whether it is an independent poison that produces its ill-effects, grain for grain according to the dose in which it is taken, or if the substratum is an important factor, and if its degree of toxicity depends on the excess of one food substance in the diet or on the absence of another. Argemone oil is not an adulterant in the sense that it is often added to the oil by the retailer, deliberately for the sake of increasing his profit, but it is an accidental contaminant of the mustard crop as it grows in the field; it is a self-sown weed which can be distinguished easily from the mustard plant when the crop is harvested, and, though the seeds are very similar, they could be picked out by a careful farmer. It is quite understandable that some years would be more favourable to the weed than others and that its percentage incidence in the crop will vary from place to place, but apparently it is a very common contaminant and a large number of samples of oil show its presence, so that it is easier to account for the wide prevalence of the disease than it is to understand why it is not more prevalent. It is, for example, not quite clear why epidemic dropsy is comparatively rare amongst the poorer Anglo-Indian community

who use mustard oil for cooking almost exclusively. Is it simply because it is heated and partly inactivated, or is it something to do with the general composition of their diet, in which rice does not preponderate to the extent that it does in most Bengalee diets? There has long been a strong belief, prevalent amongst both patients and doctors, that rice *per se* is bad for an epidemic dropsy patient; this belief is independent of the rice-toxin theory, because it applies to any form of rice, sound or diseased, and Professor Ellis C. Wilson, studying cases of epidemic dropsy in the hospital attached to the School of Tropical Medicine, a few years ago, found that there was a distinct increase in the œdema whenever a patient was given a rice diet. There is therefore some evidence that people who live on a diet consisting largely of rice, by virtue of its high carbohydrate or low vitamin content, are more susceptible to the disease, and that rice, though not the main culprit or the vehicle of the noxious factor, does play a part in the ætiology of epidemic dropsy.

In the study of vitamins, the idea of 'conditioned toxicity' is now gaining ground; there are numerous examples reported of the toxic effect of a toxic substance being conditioned by the nature of the diet and/or the state of vitamin saturation of the subject, *e.g.*, selenium poisoning and a high protein diet, lead poisoning and vitamin C, and indol and vitamin B. Is this possibly another such example? Such an hypothesis would provide a means of co-ordinating some of the earlier theories regarding epidemic dropsy with the latest one, for vitamin deficiency was visualized as a possible cause long before the present vitamin age, and even before the word *vitamine* was invented.

There is every indication that medical research has scored another practical triumph, but that the fascinating and stimulating story of the rise and fall of a serious epidemic disease, which has been written *in extenso* in the pages of this journal over a period of sixty years, has now reached its final chapter, we do not believe.

KATAKAR OIL POISONING

By SARASI LALL SARKAR, M.A., L.M.S.

Civil Surgeon, Malda

(Reprinted from *Indian Medical Gazette*, 1926, Vol. LXI, p. 62)

THE following occurrence shows that symptoms like those of epidemic dropsy have resulted in some cases from the use of adulterated mustard oil.

In a village named Attar, situated about three miles from the Bamangola Thana in Malda district, there occurred a few cases resembling epidemic dropsy, which on careful investigation were found due to the use of mustard oil adulterated with what is known as *katakar* oil. The cases occurred about three years ago in August 1922. I intended to publish the reports of the cases, after ascertaining, if possible, something about the physiological action of *katakar* oil. But as I have

not found this last to be possible I content myself with publishing the notes of these interesting cases from my note book on the eve of my transfer from this district.

Katakar oil is the oil obtained from the mustard-like seeds of an Ayurvedic medical herb known as *Stalkata* which has multi-lobed thorny leaves and produces bell shaped bright yellow flowers. The scientific name of the plant, as ascertained from the Curator of the Royal Botanical Gardens, Calcutta, is *Argemone mexicana* Linn. an American weed that has run wild throughout the country, and is commonly known as the Mexican prickly poppy.

The following is a brief account of the occurrence resulting from the use of mustard oil adulterated with *katakar* oil.

Five or six days before the *Janamastami* festival, i.e., on the 9th or 10th August, the wife of Gamaroo, an oilman, prepared some *katakar* oil, as generally used medicinally for such skin diseases as scabies and eczema, in an oil-mill and the oil-mill was put aside without being washed or cleansed properly. Her husband, the oilman, was ignorant of this fact and he prepared some mustard oil in the same oil-mill, and this was taken for cooking purposes just before the *Janamastami* festival in the houses of the following persons:— (1) Ramchandra Mondal, (2) Pancha Mondal, (3) Moti Mondal.

The main ceremony and the chief pleasure of the *Janamastami* festival is frying cakes of the thick juice obtained from palm fruits in mustard oil and eating them. Thus a large quantity of this adulterated oil went into the system of the members of these families on the occasion of this festival and all the members of these three households were affected.

In the house of Ramchandra Mondal, there was a boy aged 5 years and another boy aged 12 years, four adult females and seven adult males ranging from about 17 years to 40 years. All these were affected.

In the house of Pancha Mondal a boy aged 7 years and an adult aged about 42 years who were badly affected died subsequently. Besides this, three boys ranging from 10 to 13 years of age and one adult male of 52 years of age and two adult females were affected in the house.

In the house of Moti Mondal two boys aged 5 years and 7 years, three adult females, and two adult males were affected.

The date of the onset of symptoms was the 12th of August, 1922. The earliest symptoms were excessive spitting and vomiting, which was followed by disturbance of the bowels, followed by gradual oedema of the feet and legs. The affected persons placed themselves under the treatment of a village quack on the 21st of

August, who treated them up to the 31st of August without benefit. Meanwhile the affected families were able to discover the fact that their disease was due to the use of adulterated oil on *Janamastami* day. On hearing about the epidemic I wrote to the Medical Officer, Bamangola, to send me any information which he possessed regarding the cases. He confirmed the fact that the outbreak of the disease which so resembled epidemic dropsy was really due to the use of adulterated oil, but the clinical description was very meagre in his report and is contained only in the following lines:—

'I was called to attend the cases on 5th September, 1922, and found the following symptoms:—

1. Intense pain all over the body.
2. Inflammation of the leg from the toes to the hip.
3. Profuse diarrhoea in some cases, and in others severe constipation.
4. Slight fever running up to 101°F.'

The cases were subsequently seen by the medical officer a month later, when he found these symptoms to be gradually subsiding.

I saw some of the cases, a month later, and found some amount of solid oedema left on the lower part of the leg and feet in some cases.

Two of the girls who went to buy oil from the oilman finding only a very small quantity of residual oil left, smeared the oil over their heads. On the night of the same day the scalp was found to be inflamed with a burning sensation on the head and later on there was marked falling of the hair.

Regarding the properties of the oil derived from the seeds of this plant, the following information is contained in the *Dictionary of Economic Products*, by Sir George Watt, Vol. I, part III, pp. 306-309:—

'The seeds yield a pale yellow, clear, limpid oil; used in lamps and medicinally in ulcers and eruptions.

There is also a great difference of opinion as to the action and dose of the oil of *Argemone mexicana*.'

Postscript.—The following is a report on the analysis of *katakar* oil from the Director, Bengal Public Health Laboratory:—

	Extracted with ether	Expressed by machine
Refractometer reading at 40°C.	60.9	62.0
Saponification value ..	189.8	193.2
Iodine value ..	123.88	125.3
Reichert-Wollny value ..	0.38	0.26
Acid value ..	25.16	8.4
Specific gravity at 15.5°C. ..	..	0.9331

Special Article

FROM WARFARE TO WELFARE

(BEING AN EXPOSITION OF THE SOCIAL SERVICES OF THE RED CROSS IN COMMEMORATION OF ITS 75TH BIRTHDAY)

By KHAN BAHADUR A. HAMID, D.P.H.

(Organizing Secretary, Indian Red Cross Society, and General Secretary, St. John Ambulance Association, Indian Council)

THE world-wide humanitarian organization of the Red Cross is celebrating its 75th anniversary during 1939. It has been a great boon to the world and it is capable of doing immense good in the field of health and welfare. A history of its development and an account of its activities with particular reference to India may

therefore be of interest to the medical profession.

This international organization was formed 'for the amelioration of the condition of wounded in armies in the field'. It took its origin chiefly through the efforts of Henri Dunant, a Swiss gentleman of humble means, who had been greatly influenced by the work of Florence Nightingale in the Crimean War of 1854-6, and by his own experience at the battle of Solferino during the Franco-Austrian War of 1859. This battle had lasted for fifteen hours and claimed as its victims 38,000 dead or dying soldiers for whom there were little medical or nursing facilities. Delegates of sixteen countries assembled on 23rd August, 1864, and

signed an agreement. This agreement, called the Geneva Convention, is still in force. It recognized the principle of the neutrality of the sick and wounded in war time and authorized the formation of voluntary relief societies to supplement regular army services. It adopted a distinctive symbol—the Red Cross on white background—to be worn by the personnel of these societies, and to mark hospitals and ambulance stations on the battlefield. This symbol honours the country from which this humanitarian movement had originated, as it is the Swiss Flag with reversal of colours. The Red Cross, which did not take its origin on any religious ground, thus became a recognized emblem of mercy.

The signing of the Geneva Convention not only led to the formation of a number of national Red Cross societies but it gave rise to a small committee, called the International Red Cross Committee composed of Swiss citizens.



Indian Red Cross Society Headquarters, New Delhi.

which became the legal guardian of the Convention to see that it was faithfully observed. This Committee also helped to bring the various national societies in touch with one another and to encourage the formation of new societies. The Red Cross started as a voluntary organization for purposes of war, it did admirable work during the Great War, and can well be said to have been the 'greatest mother in the world'.

When the war came to an end the fighting forces were demobilized. Every Red Cross society had expanded to meet the pressing needs of war, and the end of the war found the societies in a stronger position than ever before. The battles of modern life are no longer fought only on fields and it was decided to utilize the organization of the Red Cross as a weapon for combating the ills which afflict mankind in time of peace. This time Henry Davison, chairman

of the war committee of the American Red Cross, the most powerful of all Red Cross societies, seeing in a world federation the possibility of adding immeasurably to the happiness and welfare of mankind, took the initiative for the adoption of a peace-time programme based on health education. The result was that the League of Red Cross Societies was formed in May 1919 for the purpose of the 'improvement of health, the prevention of disease and the mitigation of suffering throughout the world'. Thus, the Red Cross passed on from Warfare to Welfare and the year 1939 is the twentieth anniversary year of this landmark in its development.

The League is a source of inspiration for the Red Cross all over the world and the living example of truly world-wide co-operation, apart from all considerations of race, politics or creed, and is concerned only with the alleviation of human suffering. The Red Cross by virtue of its traditional neutrality and spirit of impartiality is peculiarly fitted to throw a bridge between the people of the world and to foster mutual understanding. The League is pledged to be a non-political, non-governmental and non-sectarian organization. It is a federation of 62 national societies with its headquarters in Paris, and India is a full member of this federation. The International Red Cross is a term which collectively connotes the International Red Cross Committee, Geneva, the League of Red Cross Societies, Paris, and the National Red Cross Societies. It represents the organized co-ordination of these bodies by means of a single supreme body, the International Red Cross Conference, which is held once in four years. The last Conference was held in London in June 1938.

The control of the affairs of the League is vested in a Board of Governors which includes a representative of each national society. The League's budgetary requirements are met by contributions of national societies. The experience of the war and after-war periods has encouraged national societies to rely with increasing confidence upon public support and to seek to extend their membership to all classes of the population. The membership is now about 20 million of adults and another 20 million of children and adolescents.

Red Cross societies have assumed heavy responsibilities in connection with the work undertaken on behalf of war sufferers, namely the training of disabled men, assistance to ex-service men, provision of homes for the permanently disabled and assistance to the populations of devastated regions. In the health field, mention must be made of the important

contribution of societies in connection with permanent hospitals, their participation in campaigns against tuberculosis, venereal diseases, malaria and other epidemics, their co-ordination in connection with hospital social service, dispensaries and clinics, including child clinic and maternity centres, and their work in connection with the formation of emergency hospital and mobile ambulances. They have also assumed responsibilities for the training and enrolment of nurses and for assisting them and other personnel in forming voluntary corps to be mobilized in emergencies.

The aim of the extension of the programme has been to create among all classes of society an enlightened desire to improve health conditions and public knowledge of the means by which they can be obtained, and to promote popular health education, public-health nursing work and Junior Red Cross work.

The Junior Red Cross is described as a particularly appropriate means of furthering the education of the rising generation in the health field and of inculcating in children, at an age when they are most amenable to suggestion, the spirit of service which is at the root of the Red Cross ideal, the motto of the Junior Red Cross being 'I Serve'. Although a late-comer among youth movements, in numerical strength and geographical extent it is the largest youth organization of the world to-day.

During the last war the Red Cross work in India was done by an Indian Branch of the Joint War Committee of the Order of St. John of Jerusalem in England and the British Red Cross Society. It was after the war that the Indian Red Cross Society was constituted under Act XV of 1920, and the administration of the surplus funds of the Joint War Committee consisting mostly of the 'Our Day' collections made on 12th December, 1917, was passed on to the Society. The headquarters of the Indian Red Cross Society is located at 20, Talkatora Road, New Delhi, in its own spacious building which is a gift of His Highness the Nawab of Junagadh. The Society has 26 provincial and state branches and 265 district branches. The adult membership is 20,000 and the junior about 5 laes. Its affairs are controlled by a representative managing body of 25 members. His Excellency the Viceroy is the President of the Society. There are various grades of membership and the constituent branches belonging to the confederation are autonomous in their own sphere of activity. The interest of the invested funds amounting to about rupees three laes is distributed to provincial and state branches in proportion to the contribution made by them to the 'Our Day' fund. The branches supplement these funds with the subscription of members whom they enrol. The important heads under which the activities of the Indian Red Cross Society may be mentioned are maternity and child-welfare work, popular health education, public-health nursing and

health visiting, relief work in disaster, supply of comforts to hospitals and Junior Red Cross work in schools.

In commemoration of the 25th anniversary of the accession to the throne of His Late Majesty, King George V, the Silver Jubilee Fund was raised in India for charitable purposes, and among the institutions which were selected as beneficiaries, both at headquarters and in provinces, were the Indian Red Cross Society and the St. John Ambulance Association. The funds of the Indian Red Cross Society were augmented to the extent of about 8 laes after distributing about 12 laes to various institutions and organizations, e.g., the King George Thanksgiving (Anti-Tuberculosis) Fund and the British Empire Leprosy Relief Association. The Indian Red Cross Society may appear to be a rich body, but the demands on it for assistance are numerous and support can be given with limitation in order to maintain its solvency, and the necessity for self-help on the part of its constituent branches by enrolling more members cannot be too strongly emphasized.

The recovery of His Late Majesty King George V from serious illness in 1929 evoked very warm felicitations throughout the Empire. In India they found expression in the form of a Thanksgiving Fund for anti-tuberculosis work and the administration of a sum of Rs. 9½ laes was vested in the Indian Red Cross Society in 1931. This has only recently been dissociated from the Society and passed on to the new Tuberculosis Association of India for which Her Excellency the Marchioness of Linlithgow had launched an appeal. A full account of the Tuberculosis Association of India is given in the *Indian Medical Gazette* of April 1939.

Maternity and child welfare.—Although the foundation of the Countess of Dufferin Fund in 1885 was the first organized effort to meet the need of a supply of women doctors for the women in India, definite steps for the improvement of the conditions of child-birth by training the hereditary *dai* class were taken in 1903 with the formation of the Victoria Memorial Scholarship Fund.

The next step was the formation of an All-India Lady Chelmsford League in 1920 for the provision of health and maternity supervisors with the main objects of training of health visitors at health schools, propaganda through literature, lantern slides and health exhibitions, and the formation of branches in provinces. The Indian Red Cross Society also carried on its child-welfare activities and in practice there was considerable overlapping. It was therefore considered desirable not only to amalgamate the two organizations and take over the Victoria Memorial Scholarship Fund, but also to include army child-welfare work among the wives of British soldiers and Indian sepoys under a common scheme. Thus came into existence the maternity and child-welfare bureau of the Indian Red Cross Society in

1931. The present annual fund for the activities of the bureau is about 1.25 lacs.

The maternity and child-welfare bureau is the only organization in India which is called upon to give assistance and advice in all branches of child welfare and has to play a special rôle in this respect, as it is through the agency of its local maternity and child-welfare organization that the work is conducted in provinces and districts. The bureau establishes policies, concentrates its attention on training workers, produces propaganda material and collects and supplies information. In 1938 grants-in-aid were given to the health schools for the training of health visitors at Delhi, Calcutta, Madras, Poona and Rangoon. A number of stipends are available for students at these institutions. One school is to be opened in Lucknow shortly. Grants have also been given to the Teachers' Nursery School, Madras, the Kindergarten, Mysore, and the School of Mothercraft, Bareilly. Legislation relating to the registration training and the qualifications for the appointment of health visitors has been passed in several major provinces and they have power to regulate standards. The diploma of the health school, Delhi, has received recognition of the Government of India. The Rangoon health school is not to be accounted for in future as Burma has been separated.

Grants have been given to certain special schemes for maternity and child-welfare work, one of which is towards the work of the Najafgarh health unit, and the U. P. provincial branch supports all the maternity and child-welfare work in the Partabgarh (Oudh) health unit, both of which have been established with the aid of the Rockefeller Foundation. The staff employed by local committees includes trained indigenous *dais*, trained non-indigenous midwives, maternity supervisors, health visitors and medical women. Some branches concentrate on domiciliary midwifery, some on maintenance of small maternity homes, others on welfare centres. The centre which shows the most successful work is awarded the Irwin Challenge Cup.

There are ten or twelve places where schools for midwifery training have been established and over 200 non-indigenous midwives and over 1,000 indigenous ones have been trained annually. Some of the *dais* obtain the Victoria Memorial Scholarship certificate. The army child-welfare work owes much to the help and enthusiasm of voluntary workers. There were 54 Indian and 26 British army centres during 1938.

The Indian Red Cross Society co-operates with the Trained Nurses' Association of India in the work of the Indian National Committee of the Florence Nightingale International Foundation and provides for a scholarship for training a suitable health visitor in the international course for post-graduate nurses in England annually.

A scheme of enrolment of trained nurses for emergency or war service, in co-operation with the Trained Nurses' Association of India, enables the Society to maintain a list of nurses who can be called upon for mobilization at short notice, either in case of war or in a national disaster. Nurses were mobilized to help the injured at the Bihtra railway disaster in 1937. The much-coveted Florence Nightingale medal for meritorious work in nursing in India is awarded biennially to deserving candidates on the recommendation of the Indian Red Cross Society.

Popular health education is the most important aspect of the peace-time work of the Indian Red Cross Society, whether done through the maternity and child-welfare centres, for pre-natal, natal, post-natal, toddler or pre-school stages, through the Junior Red Cross for the school age, or through other agencies for the adult. Its need is as great in urban areas as in rural. A large variety of material is stored in the Red Cross Depôt at headquarters which is distributed to various agencies and the teaching work is done in all its forms.

Pictorial posters, pamphlets, lantern slides and cinema films explaining the conditions of prevailing epidemic diseases in the form of stories of common occurrence, and in local setting, are extensively made use of besides demonstrations at health exhibitions. School hygiene, prevention of blindness, maternity and child welfare, tuberculosis, nutrition, rural hygiene and sanitation are among the other subjects on which different kinds of material have been prepared and utilized.

The work of a fully-equipped cinema section of the Indian Red Cross Society is fourfold, *viz*, film production, its distribution through a circulating library, slide production and still photography. The library has 35 films of standard and about the same number of sub-standard sizes and there were 425 demands on the film library in 1938. General press publicity and publicity through radio talks are also done. The Indian Red Cross Society issues an illustrated bi-monthly *Journal* and another, the *Indian Junior*, which are entirely supported by their subscriptions. Some provincial branches also publish their own journals.

The Junior Red Cross is organized through school groups with the help of the teacher who is designated by the internationally recognized appellation of Counsellor. The following are its principal aims:—

- (i) Promotion of health, especially the practice of health habits.
- (ii) Service to the sick and suffering.
- (iii) International friendliness promoted through the exchange of school correspondence albums between Junior Red Cross members.

The Junior Red Cross grew out of a sense of the necessity for improvement in personal

hygiene and the recognition that the formal teaching of hygiene could do very little to form habits of healthy living which are so essential. It has a purely co-operative character in that it does not seek to form independent groups with outside rules but to bring into life school influences that can be used by Counsellors. The Junior Red Cross performs the stimulative function of the voluntary organization which touches life at many points and provides the young members with a means of self-expression and self-realization in relation to the community, growing with their growth and preparing them, when their junior days are over, to be more serviceable to their country and perhaps to the world. Physical training ceases at doing exercises and has no educational side about it, and it must have physical education grafted on it. The latter is an educational programme in normal habits and functions and actions of the body with an appreciation of healthy living in respect of thought, action and every other aspect, and here comes in the utility of the Junior Red Cross.

The Junior Red Cross with its activities for the promotion of health, spreading in all directions, and especially in anti-epidemic and village improvement work has fully established itself in India. The practice of health habits, cleansing of school premises, gardening, soap making, canteen management, sale of stationery on a co-operative basis, first aid, health exhibitions, poster and model making, writing of health essays, health propaganda, health plays, competitions, rural work and exchange of international correspondence albums have kept the spirit of the Red Cross alive among the 5 lacs of members of the rising generation. Provincial branches award certificates of recognition to Counsellors of the two or three years' good service and headquarters gives a badge after five years. Lectures on prevention of blindness and on nutrition are organized for teachers in training institutions.

Junior members have been most active in learning first aid and home nursing, and in forming cadet divisions, which correspond to adult ambulance and nursing divisions of the St. John Ambulance Brigade overseas, and both have rendered useful public service and service to the sick and suffering. The part played by the Knights of St. John in works of charity about one thousand years ago is now a matter of history. In 1877 the Order of St. John with its motto to 'work for the good of mankind' established the St. John Ambulance Association as part of the voluntary-aid movement to train men and women in first aid, home nursing and ambulance work in order to furnish aid to the sick and wounded, and to co-ordinate in days of peace and war all offers of voluntary assistance. The trained personnel formed a number of detached ambulance corps for combining their individual efforts for the public advantage and they were banded together in a Brigade in 1887,

and the first corps overseas was formed in 1892. The ambulance work among railwaymen, police and volunteers started in India in 1901. The Indian branch, afterwards Indian Council of the Order, was formed in 1904 and the first brigade ambulance division (men) and nursing division (women) were formed in 1905. The St. John Ambulance Brigade overseas was established in 1911.

The Indian Red Cross Society has recognized the St. John Ambulance Association and Brigade as the ambulance division of the Society and all ambulance responsibilities of the Society have been delegated to them, including emergency relief organization in so far as it concerns personnel. The Society has therefore agreed to give financial support to the Association. There are separate membership subscriptions for the Association. Both the organization at headquarters and in provinces are more or less under a joint management. The St. John Ambulance Association (Indian Council) has a fixed income of about Rs. 30,000. It maintains a stores depôt for the supply of books and equipment. It issues certificates for courses in first aid, home nursing, domestic hygiene and mothercraft, hygiene and sanitation, Mackenzie school course, and air raid precautions and anti-gas measures. There are about 300 centres of the Association in provinces, states, districts, and on railways, and in 1938 alone the Association issued over 21,000 certificates to members of military forces, railway and police employees, men of the criminal tribes, inmates of prisons and reformatory schools, workers in mines and factories and students in educational institutions, besides about 8,000 for the elementary, Mackenzie school, course.

For brigade work of the Ambulance Department there are 13 districts, which have been or are being formed on a provincial basis and are in charge of the heads of the respective medical departments. There are 112 ambulance divisions of uniformed men, 35 nursing divisions of women, besides 37 divisions of cadet divisions of youths, and more are in formation. A scheme of voluntary aid reserve, formerly voluntary aid detachment, consisting of members of nursing divisions has been introduced with the sanction of the defence department to supplement the military nursing services in India in time of war or national emergency.

The history of the Society is replete with disaster-relief operations made in cash, kind and personnel. The Bihar earthquake of 1934, the Quetta earthquake of 1935, the Bihta Railway disaster of 1937 are among the instances where valuable services were rendered. Active part in relief work has also been taken at fairs, exhibitions and other public functions, and in floods, fire and famine. Among other instances of relief measures may be mentioned assistance to the sufferers of a severe malaria epidemic in Ceylon in 1934-35, and to refugees in Abyssinia, Spain, France and China.

many other workers have played their parts. In connection with the important International Conference

on Rabies held in Paris in 1927 it was stated 'Indian experience dominated the Conference'.

Current Topics

The Treatment of the Enteric Fevers

By HAROLD COOKSON, M.D., M.R.C.P.

(From the *Practitioner*, Vol. CXLII, June 1939, p. 683)

THE enteric infections comprise typhoid and paratyphoid fevers. The former is due to infection with *Bact. typhosum* and the latter to infection with *Bact. paratyphosum* A, B or C; in this country paratyphoid infections are most commonly with *Bact. paratyphosum* B, less frequently with A and only very rarely with C. Typhoid fever proper is the most severe of these infections and the prevalence of epidemics has been greater in the last few years. The mortality in many other acute infections has been considerably reduced by the introduction of new methods of treatment, but that of typhoid fever is still about 10 per cent or more, and its fatality rate is higher than that of most other acute infections commonly occurring in this country. The treatment of the enteric infections can be conveniently considered from four aspects:—(1) prophylactic, (2) general, (3) symptomatic and (4) specific.

PROPHYLACTIC

The patient must be strictly isolated and domiciliary treatment should not be lightly undertaken. If satisfactory accommodation and the services of nurses specially trained in the care of infectious cases are not available in the home, removal to hospital is to be strongly advised. While handling the patient the attendants must wear gowns and wash thoroughly in soap and water afterwards. His bed and personal linen must be soaked in 1 in 20 solution of carbolic acid before being boiled, and crockery, enema syringe, bedpan, urinal, thermometer, stethoscope and any instrument used on the patient must be efficiently disinfected. Stools and urine may be regarded as more or less pure cultures of the infecting organisms and must be treated with the greatest care. The urine should be mixed with an equal volume and the stools with twice their bulk of 1 in 20 carbolic solution and allowed to stand for several hours before being poured down the drain. If the patient should take a bath the water is afterwards treated with chloride of lime ($\frac{1}{2}$ lb. to 50 gallons of water) and allowed to stand for half an hour before being discharged, and sponging and washing water should be dealt with on similar lines. Sputum, vomit, discharge from the ears or abscesses, or any other wound which may be present, require disinfection. All these precautions are continued until bacteriological examination of the stools and urine is negative on three consecutive occasions, the specimens being collected at intervals of not less than three or four days.

If bacilluria or positive stool cultures persist for a long time during convalescence, the individual is regarded as a possible chronic carrier. The Vi agglutination test recently suggested as an aid to the detection of true chronic typhoid carriers may prove to be of practical value. Urinary carriers may respond to treatment by urinary antiseptics, such as hexamine, mandelic acid, sulphonamide or one of its derivatives. Whether or not hexamine and sulphonamide are also effective against biliary carriers has not yet been established.

GENERAL TREATMENT

In any acute infection the emphasis on general treatment in which skilled nursing plays a large part, varies inversely with the value of the specific treatment available, and the potency of the latter in enteric infections is not yet so high as to displace the general

treatment from its important position. The patient is nursed in a well-ventilated, barely furnished room, kept at about 60°F., and on a narrow bed with a hair mattress and one pillow. So long as the temperature is raised, one sheet and one blanket are adequate covering. Smooth sheets not only add to comfort but lessen the risk of injury to the skin, which should be rubbed frequently with spirit over the pressure points. The buttocks should be washed and powdered after each bowel action. To prevent cracked lips, vaseline, liquid paraffin, or camphor ice may be applied, and the mouth should be cleaned after each feed. The patient is not allowed out of bed until the temperature has been normal for one to two weeks, depending on the severity of the attack.

The high and prolonged fever makes it necessary to supply large amounts of fluid and to try to maintain nutrition by a diet of adequate calorie value. An increase in temperature of 1°F. raises the basal metabolic rate by about 7 per cent; in most cases of typhoid fever with temperature of 102–104°F. the metabolism will be increased by about 30 per cent. With the all-fluid diet as formerly used under-nutrition was inevitable, and it is now believed that a more liberal diet can often be taken with advantage and without increasing the liability to intestinal hæmorrhage. After hæmorrhage from peptic ulcer, for example, there are observations which suggest that immediate feeding with milk in small quantities or even light solids has no harmful effect. The diet to be aimed at for the average adult patient with enteric fever is one containing 3,000 to 4,000 calories (or 30 cal. per lb. body-weight) and the fluid intake should amount to four to eight pints daily, though it is not always possible to attain these levels. It is also necessary to see that the diet is balanced not only in regard to protein, fat and carbohydrate, but also in its content of the accessory food factors. Milk or milk substitutes may still form a considerable part of the diet, but in addition the following can usually be given: cream, lactose, butter, egg, toast, biscuits, mashed potato, custard, junket, rice pudding, blanchmange, cream soup, gruel, apple sauce, milk chocolate, and ice-cream. After a preliminary period of twenty-four hours of two-hourly milk feeds, flavoured with tea, coffee or cocoa, the above-mentioned additions may be gradually made until an intake of 3,000 or more calories is reached. The table at the end shows the general lines of such a diet, though adaptation to the individual patient's tastes and condition will be necessary. Between feeds plain water and barley water can be given *ad lib.*, also lemonade, orangeade, or other fruit drinks with added lactose or glucose. Extra vitamins are called for, particularly C, and although the latter will be supplied in fresh fruit-juice drinks, the pure vitamin in solid form should also be given as ascorbic acid 100 mgm. daily in a milk feed. Vitamins A, B and D are conveniently given as some potent fluid preparation. Alcoholic drinks of any kind are contra-indicated unless the patient has been used to considerable quantities. In stuporose patients adequate feeding by mouth may be impossible and feeding by a tube passed through the nose into the stomach may be attempted. No addition to the diet as outlined is made until the temperature has been normal for a few days, when it is gradually increased. If any symptoms of relapse appear, the diet is at once reduced to the former level.

Hydrotherapy.—In patients with high temperatures, the former rigorous treatment by cold baths and ice packs has now been superseded by more moderate measures, and the tepid sponge is the most satisfactory. If the temperature is accompanied by toxæmia, the

limbs, chest, abdomen and back are sponged and dried one by one, using water at about 90°F., and repeating the procedure four-hourly if necessary. The tepid sponge is contra-indicated if there has been intestinal hæmorrhage or if severe meteorism is present, and if phlebitis has occurred the affected limb is not disturbed. Tepid sponging is not contra-indicated by pneumonia.

SYMPTOMATIC TREATMENT

Symptoms referable to almost every organ in the body may occur in the enteric fevers, and it will be possible to mention the treatment of only the more common ones. For *constipation*, which is more frequent than diarrhoea, simple enemata are indicated, the purgatives of any kind must be forbidden. *Diarrhoea* if excessive calls for extensive reduction in the diet; diluted citrated milk may be given and a starch and opium enema, or a gentle colonic wash-out with water. *Meteorism*, resulting from fermentation and poor intestinal tone, is controlled by reducing the carbohydrate intake; counter-irritation to the abdominal wall in the form of turpentine stupes may be applied, but drugs which stimulate motor activity in the intestine, such as pituitrin or eserine, are best avoided, and the so-called intestinal antiseptics are of no value. *Oral sepsis* must be guarded against by frequent cleaning between feeds, stimulation of salivation with diluted lemon-juice, and by keeping the lips soft with some oily preparation. When intestinal hæmorrhage occurs food and fluid are withheld for twenty-four hours, and an injection of morphine is given if the patient is restless. The various proprietary hæmoplastic sera are of questionable value. After hæmorrhage large doses of vitamin C should be given, either orally or intravenously, 500 mg. daily by either route, since deficiency of this substance is believed to increase the fragility of the capillaries and to delay the healing of wounds. Severe degrees of vitamin-C deficiency were found by Portnoy and Wilkinson in association with hæmorrhage from peptic ulcer. Intestinal perforation demands immediate surgical intervention. The pain of pleurisy, which is not uncommon, and that of non-suppurative cholecystitis, which is rare, may be relieved by local hot applications. If pneumonia develops, and the hypostatic form is the most frequent, the patient should be propped up and, in the presence of purulent expectoration, a drug of the sulphonamide series may be of some value. A drug of this group should also be considered if local septic complications arise, such as otitis, arthritis and superficial and inflammatory foci, but surgical drainage will be called for if a definite abscess forms. For *thrombophlebitis* the limb is raised, bandaged over wool and immobilized. Hexamine has usually been given for *bacilluria*, but the condition may be symptomless and the drug may do more harm than good by irritating the urinary tract with the production of hæmaturia. *Retention of urine*, if not relieved by hot fomentations over the bladder and an enema, is treated by catheterization. *Headache* and *insomnia* may respond to hydrotherapy, but if not, small doses of bromide and one of the barbiturates may be given. In protracted severe cases with delirium an adequate intake of fluid by mouth is generally impossible and it is in such cases that the signs of peripheral circulatory failure, especially a rapid and feeble pulse, are likely to appear. For this condition intravenous infusions of glucose saline, by the drip method if possible, are of great value. Drugs cannot be expected to influence this condition to any great extent, but subcutaneous injection of ephedrine ($\frac{3}{4}$ grain) combined with adrenaline (5 minims) or one of the several proprietary substances chemically allied to ephedrine may be more effective in raising blood pressure than those reputed to act by stimulation of the medulla, such as strychnine and coramine. Digitalis is contra-indicated unless there is coincidental heart disease with congestive failure. Injections of suprarenal cortical extract may be used for the asthenia and low blood-pressure of the later stages of the illness, and good results have been claimed from the routine use of this extract combined with large doses of vitamin C.

Blood transfusion.—Transfusion of blood has a place in treatment under certain conditions. For severe or repeated intestinal hæmorrhage which produces symptoms of shock immediate transfusion is advisable with stored blood of group O. Prolonged cases with severe toxæmia and some anemia due to repeated small hæmorrhages or to the chronic toxæmia may benefit from blood, preferably from a donor who has been actively immunized by T.A.B. vaccine rather than from a subject convalescent from the disease, and in epidemics it is usually easy to find a suitable donor. A further injection of vaccine into the donor twenty-four hours before withdrawing the blood is recommended by Bower but usually such delay is inadvisable. If an immunized subject is not available, antityphoid serum should be given along with blood from an ordinary donor. Against transfusion it might be objected that it would increase the tendency to venous thrombosis, to which embolism may be a sequel. In practice this complication is not found to be more frequent in the transfused cases, nor does the increase in the volume of circulating blood aggravate bleeding from the intestine; on the contrary it appears to have a hæmostatic effect. The blood is citrated and given in amounts of 100–300 cubic centimetres (3–10 oz.) or in larger quantities if the drip method is employed.

SPECIFIC TREATMENT

An ordinary vaccine of *Bact. typhosum* has sometimes been used during the course of an enteric infection, but a good case for its value has not been made out. The use of vaccine is liable to be followed by a severe reaction and, if the symptoms are already serious, this may be dangerous. Vaccines modified by bacteriophage or by incubation with typhoid convalescent blood, by which methods the organisms are lysed, are held to be superior to the ordinary vaccine, but they appear nevertheless to have similar disadvantages. It is doubtful if these methods produce effects other than those resulting from non-specific protein shock.

Antityphoid serum.—Antisera have been used in many countries for at least thirty years, but until recently these have had little success, a fact which is explained by lack of knowledge of typhoid antigens and antibodies. Without this knowledge the preparation and standardization of a potent serum are not possible. To-day, however, as a result of the intensive investigation of typhoid antigens by Felix and his co-workers, it is known that a virulent strain of the organism produces the two antigens termed Vi and O, and that to be effective an antiserum must contain the two appropriate antibodies. The serum now prepared by the Lister Institute (supplied by Messrs. Allen and Hanburys) contains these antibodies in high concentration as shown by the agglutination titres of 1:3,000 or more for Vi antibody (against strain Watson) and 1:20,000 or more for the O antibody (against strain 901). The serum will protect mice against otherwise lethal injections of live *Bact. typhosum* and also against the effects of massive doses of dead organisms, and the several reports so far published on its clinical effects have all been favourable. One of these reports deals with a trial in seventy-three patients in 1936, and a beneficial effect on both toxæmia and temperature was noted in a significantly high proportion of cases. Since that time the potency of the serum has been increased considerably, the titre of the O antibody being doubled and that of the Vi antibody more than trebled.

The serum should be given as early as possible in the course of the disease, either intramuscularly or intravenously, diluted with normal saline if the latter route is used. For an adult three or more doses of 33 cubic centimetres each should be injected at intervals of twenty-four hours. For children smaller doses suffice. The beneficial effect of the serum is usually manifest not later than a day or two after the third injection. If at that time there is still no improvement and the condition of the patient is causing anxiety, it is advisable to give further doses of the serum.

If the patient is known to be allergic or to have received some form of serum previously, desensitization should be carried out by repeated small doses of the serum (0.01, 0.1, 0.2, 0.5 cubic centimetre) subcutaneously at half-hour intervals, and followed by a similar series of injections intravenously. In severe cases the intravenous route is preferable and serum may be conveniently given in a glucose saline infusion. When in spite of precautions the injection is followed by symptoms of anaphylactic shock, adrenaline 5 minims subcutaneously should be given. In practice anything more severe than a rash as an untoward reaction to the serum is rare. For good results early use of the serum in full doses is advisable; in late cases with severe toxic changes in the viscera and nervous system, this method can only be relatively of small value, though serum is useful at the onset of a relapse. The serum is of no value in the treatment of paratyphoid fever.

Specific prophylactic treatment with vaccine of typhoid contacts is a matter which is still controversial, but such persons may be safely given protection by injection of the antiserum. The protection thus conferred will, however, last only for a short period (about two weeks). The dose is 33 cubic centimetres intramuscularly for an adult and 7-20 cubic centimetres for children according to age.

Chemotherapy.—The success attained by sulphonamide and its derivatives in the treatment of acute infections with *B. coli* of the genito-urinary tract and of the portal vein in man, and of *B. coli* septicæmia in animal experimental infections, suggests that these drugs might also be effective in infections of the enteric group, as the organisms concerned are morphologically similar. In mice a single dose of sulphonamide was found to give protection against *Bact. typhosum* and also against *Bact. paratyphosum* B, but its precise value in the treatment of human infections, if any, will depend on the results of extensive observation, which are not yet available. Theoretical considerations would suggest that early treatment with this type of drug combined with antiserum might be the most effective method. On the carrier state preliminary reports give promise that the action of sulphonamide and its derivatives may be of importance. In a case reported by Barer typhoid bacilluria cleared up following the administration of sulphonamide, though previous treatment with hexamine and with ammonium mandelate had failed to sterilize the urine. This patient, however, was recovering from an attack of typhoid fever, and was not a true chronic carrier. Of greater significance is Bazin's report of a chronic faecal carrier of *Bact. paratyphosum* B, in whom the liver bile still gave positive cultures after cholecystectomy, but in whom sulphonamide caused the disappearance of the organism from faeces and bile after hexamine had failed.

Diet in enteric fevers

(3,000 calories)

6 a.m.	Milk, 5 oz.; cream, 1 oz.; lactose, $\frac{1}{2}$ oz.
8 a.m.	Gruel, 7 oz. (e.g., milk, 2 oz.; farex, 1 oz.; butter, 1 teaspoonful; barley water, 5 oz.; sugar or salt to taste); toast, 1 slice; butter, $\frac{1}{2}$ oz.
10 a.m.	Cocoa, 8 oz.
12 noon.	Vegetable cream soup with salt, 8 oz.; egg, 1; toast, 1 slice; butter, $\frac{1}{2}$ oz.; chocolate blancmange, 6 oz.
2 p.m.	Malted milk, 8 oz.
4 p.m.	Milk, 5 oz.; cream, 2 oz.; lactose, $\frac{1}{2}$ oz.
6 p.m.	Milk toast (milk, 4 oz.; cream, 2 oz.; toast, 1 slice; butter, 1; salt); toast or bread, 1 slice; b; ; egg, 1; cup custard, 4 oz.
8 p.m.	Egg-nog, 1 glass.
10 p.m.	Milk, 5 oz.; cream, 1 oz.

Distribution of Fluorosis in India and in England

By D. C. WILSON

(Abstracted from *Nature*, Vol. CXLIV, 22nd July, 1939, p. 155)

ENDEMIC fluorosis has been described in many different parts of the world. Dental fluorosis is found with waters having a fluorine content of one part per million, and in the United States considerable thought has been given to the elimination of 'mottled enamel' by improving water supplies. Stiff backs and other signs of toxic fluorosis are found when the halogen exceeds three parts per million, and in North Africa, where the amount of fluorine in the soil is considerable, attention has been directed to the agricultural and veterinary, as well as to the human aspects of the problem. Industrial fluorosis among aluminium workers who handle cryolite has been described in Denmark. In Arizona, Smith and others found that fluorine plus diet deficiency was a more potent cause of mottled enamel than fluorine alone.

India. Endemic fluorosis has been recognized among men and animals in the Madras Presidency, and fluorine has been found in the well water. In the adjacent areas of the Nizam's dominions, I, with the assistance of Dr. B. K. Badami, director of Veterinary Services, Hyderabad, found dental fluorosis among children in the Mabubnagar district. The cattle, moreover, in this area develop bone lesions with exostoses, which clinically resemble those found among animals suffering from toxic fluorosis, incurred whilst grazing near aluminium factories in Denmark.

During the past few years I have examined more than 9,000 children in various parts of the Punjab, and in certain clearly defined areas I have found evidence of dental fluorosis in the milk and permanent teeth. These areas include the eastern parts of the Mianwali district, villages near Sargodha, Hundewali near Chiniot, villages around Sangla Hill, in and around Kasur, villages near Ferozepore, and certain villages between Bliwani and Hissar. I found that the teeth were most 'mottled' among children from the lowest social classes, who showed also irregularity in the size of the individual teeth. Stiff backs and elbows have been observed among village children who used deep well water in the neighbourhood of Kasur. The Irrigation Research Institute, Lahore, at my request, kindly had water from a number of wells in the Kasur area analysed, and obtained from nil to four parts fluorine per million.

All the places where dental fluorosis has been detected in the Punjab are situated on the Indo-Gangetic alluvium, which is of practically the same composition all over the Province, and there is no reason to suppose that this alluvium contains any fluorine. Geodetic research, however, has shown the existence of a ridge of rock causing shallowing of the alluvium. The places from which I have collected records of clinical fluorosis may fairly be said to lie over this buried ridge. Dr. Heron considers it is reasonable to think the rocks forming the ridge may

that the 'knotts' clay in the Marston Valley has a fluorine content of more than 450 parts per million. We do not know the source of the fluorine in the other parts of England where human fluorosis is found. The brownish-yellow flecks and spots of pigment, together with the dull white opaque areas of dental fluorosis are easily recognized, and if borne in mind, may be noted possibly in other areas.

Life-story of Simple Herpes

(From the *Lancet*, 18th March, 1939, p. 647)

It has long been recognized that clinically herpes falls into two main groups, idiopathic and symptomatic. Before the causal agent was shown to be a filtrable virus present in the fluid of the vesicles it was thought that, in the symptomatic cases, the herpetic eruption was the work of the organism responsible for the primary condition—e.g., the pneumococcus in pneumonia. This hypothesis, however, failed to explain the idiopathic cases. The demonstration of the virus reversed the situation: the idiopathic group now became understandable on the basis of infection from without, even though this was not always easy to establish; but in the symptomatic group no such interpretation was possible, for in the vast majority a recent extrinsic infection could be ruled out. Two possible explanations were accordingly put forward: first, that sufferers from symptomatic herpes are carriers of herpes virus, which is activated by conditions such as pneumonia, malaria, and protein shock; second, that the primary disease gives rise to changes that result in the evolution of herpes virus *de novo*. The latter hypothesis, unpalatable to most virus workers, had its exponents, but the former more reasonable explanation was not long in finding support. In 1922 Levaditi, Harvier and Nicolau demonstrated herpes virus in the saliva of healthy persons, and two years later Busacca isolated it from the conjunctival sac. This proved the existence of carriers of herpes virus and it was soon shown that, judging by samples, about two-thirds of the population have herpetic antibody in their serum. By the investigations of Andrewes and Carmichael and of Brain a close correlation between recurrent herpes and the possession of herpetic antibody was established.

Dr. Burnet and Miss Lush have taken the epidemiology of herpes a stage further. Making use of the egg-membrane technique, which Burnet's researches have done much to make available for virus study, these Australian workers have been estimating herpetic antibody in human sera. They were induced to undertake this investigation by Weyer's claim that herpetic antibody is absent from the serum in early poliomyelitis, and although they were unable to confirm this, they have made a number of interesting observations in other directions. Not only have they confirmed the findings of previous workers as to the widespread existence of herpetic antibody in human sera, but like Andrewes and Carmichael, they have been struck by the fact that the people examined have either much of the antibody or none at all; there is no intermediate group. This finding, as they point out, can only be explained on the assumption that those who are infected with herpes virus become permanent carriers. A further important observation concerns the distribution of herpetic antibody among adults in the different strata of society: they report that the proportion proved much higher in the 'hospital class' than among the well-to-do. It is the persons possessing antibody who carry the virus and are subject to recurrent attacks of herpes, and the uneven social distribution is consistent with the idea that the primary infection takes place in the early years of life; if it is avoided at that time increasing age brings increasing resistance—not, it seems, through the development of a specific immunity but through some change in the mucous membranes that renders them insusceptible to the implantation of herpes virus. There is indeed some positive evidence that the primary herpetic infection does occur early in life. Dodd, Johnston and

Budding have shown that aphthous stomatitis in infants and young children is caused by the herpes virus and they regard this condition as a primary herpetic infection. Burnet and Lush isolated herpes virus from two young children with aphthous stomatitis at a time when neither child had any herpetic antibody in the serum, and three weeks later the serum of one child contained a considerable amount of antibody. To sum up the discoveries of the last ten years one may say that primary herpetic infection, commonly in the form of a stomatitis, occurs in early childhood, and the person thus infected becomes a permanent carrier. If a child escapes infection during the first decade the chance of herpes virus being implanted later becomes remote, the carrier state is not set up, and symptomatic herpes will never develop. In carriers the attack of herpes is attributable to an upset of the balance between host and virus—for example, by infection, worry, fatigue, or menstruation.

One important question remains unsettled: where does the virus reside in the carrier? There are two possibilities. Either it persists in the cells of the affected mucous membrane, or like the virus of zoster it takes up permanent quarters in the appropriate sensory ganglia. Burnet and Lush favour the second hypothesis but have failed to obtain any corroborative evidence, for they were unable to isolate herpes virus from the gasserian ganglia of individuals who possessed herpetic antibody and were therefore carriers. Although this limited failure does not exclude the possibility that herpes virus is carried in nerve tissue, other considerations make it unlikely. In zoster multiplication of the virus in the posterior spinal root ganglion is almost always attended with intense pain, whereas there is no such pain before a herpetic eruption except in those rare cases where herpes simplex simulates herpes zoster. Furthermore, the virus of herpes simplex has been recovered from the mouth between herpetic attacks, and if its residence during quiescent periods is the gasserian ganglion what was it doing in the mouth? One would expect it to lie quiescent in the ganglia until reawakened into activity by some new upsetting factor. In view of these two objections it is difficult to share Burnet and Lush's preference for the second hypothesis; the facts seem to be more readily explained by assuming that the virus persists in the cells of the mucous membrane.

Rickets and Dental Caries

By D. C. WILSON

(From the Proceedings of the Physiological Society, 13th May, 1939. *Journal of Physiology*, Vol. XCVI, 14th June, 1939, p. 8P)

EXPERIMENTAL work has shown that the incidence of dental hypoplasia and of caries is reduced or even abolished by adequate amounts of vitamin D in the diet. Indeed, the association of rickets and 'bad teeth' has been recognized in this country since Glisson's original description of the disease. One would therefore expect that in a community where rickets was widespread the teeth would be much worse than in a similar community in which there was no clinical rickets. This is not necessarily the case, as the following observations show.

During the past three years comparative diet surveys have been carried out among various Indian communities, and over 9,000 children (5-15 years) have been examined clinically by the same observer. The examination included a search for past and present signs of rickets and an inspection of the teeth. The number of teeth present in the mouth was recorded and the number which were carious to naked-eye examination. It was exceptional to find children who had had dental care, but in such cases teeth treated by a dentist were counted as carious. The incidence of hypoplasia and hypocalcaemia sufficient to give a sensation of roughness with a probe was also noted.

Rickets and osteomalacia are exceedingly common in certain parts of north India, notably in the Kangra valley which lies in the Himalayan foot-hills. In an

examination which was carried out there it was found that twenty-four out of a total of forty-five children showed signs of rickets, late rickets or osteomalacia. The same children had almost perfect teeth, with a very low incidence of caries and little hypoplasia. The teeth of these children were, in fact, no worse than those of 938 children in the Central Provinces living on a similar diet and among whom no case of rickets was discovered. These dental findings were communicated to Dr. Marshall Day, who, at my suggestion, examined fifty children in the Kangra valley, all of whom had severe rickets, but nearly all of whom he found to have excellent teeth.

Changes in the Nails as an Aid to Diagnosis and Prognosis

By R. CRANSTON LOW, M.D., F.R.C.P.E., F.R.S.E.

(From *The Practitioner*, Vol. CXLII, May 1939, p. 627)

Few medical men, when examining a patient, make even a cursory inspection of the nails. Yet a good deal of information can sometimes be obtained from these structures. Like every other organ their normal growth depends upon the general health and they are quick to show changes when that is interfered with. When all the nails of the hands and feet show the same alteration the presumption is that it is due either to a congenital anomaly or, in the absence of any adjacent skin inflammation, to some general condition affecting all the nails through the circulation. When only some of the nails are affected and others are quite normal, a local cause should be looked for, such as a recent or remote injury, an infection of the nail itself (as in ringworm) or an inflammation or growth affecting the skin or deeper tissues round the nail. Admittedly changes in the nails are not always of first class importance in drawing attention to the presence of some systemic disease, because in many very different conditions the same nail changes may be found; but these changes may be very helpful in giving support to a diagnosis which is otherwise doubtful. The fact that the nails are affected in any general condition also indicates, to some extent, its severity and so may influence the prognosis.

COLOUR OF THE NAILS

One of the first things to be noted is the colour of the nails. This, of course, varies according as the limb is warm, cold, or cyanosed. Pressure on the nail drives out the blood from the nail-bed and when the pressure is removed the rapidity or otherwise with which the blood returns is a rough index of the vigour or otherwise of the circulation. The commonest alteration in colour is found in *leuconychia*. Everyone is quite familiar with the white spots which appear from time to time in the nails. They may be punctate or arranged in transverse striae, but there are also rare cases in which the nails are completely white and look as if they had been painted with white paint. I have seen this condition in persons who were apparently perfectly normal otherwise. Some of the cases have a family history of the condition, but it has been known to develop when there are trophic nerve disturbances such as occur in nerve leprosy. The small punctate and striate lesions are comparatively common and are generally supposed to be due to trauma. In the striate form the white areas run transversely across the nails, which may show more than one of these lines. They are much more frequent in women than in men, probably due to the fact that when women are manicuring their nails they injure the growing nail-matrix when pushing back the nail cuticle. Althausen and Gunther have drawn attention to the importance of the presence of white transverse bands in all the nails of the fingers and toes as a sign of acute or chronic *arsenical poisoning*. In such cases it has considerable diagnostic value. It must also be remembered that in chronic *arsenical poisoning* there is a concentration of arsenic in the hair and nails. By analysis of pieces of the nails and hairs the suspicion

of such poisoning can be confirmed. Similar white bands on the nails have also been produced by the administration of thallium acetate in order to cause a fall of hair in ringworm of the scalp.

The white colour is usually attributed to the presence of air spaces in the nail due to an injury which separates the layers of the nail substance, but Singer has recently suggested that they are due to imperfect keratinization at the growing nail-matrix owing to a lowered basal metabolic rate, so that keratohyalin granules persist in the cells of the fully developed nail. The light is reflected from these granules and so the white appearance is produced. Singer holds that when the nails are prepared for microscopic examination these keratohyalin granules are dissolved out by the acid used to soften the nail in order that sections may be cut, and so the appearance of air spaces is produced. Once formed the white spots are permanent till they disappear at the tip of the growing nail.

Less frequently than the white marks the nails may show discolorations varying from light yellowish-brown to blue, purple and black. In chronic *arsenical poisoning*, instead of *leuconychia* the nails may show the same brown pigmentation as the skin of the fingers or toes. In Addison's disease, even although the skin is deeply pigmented, it is only occasionally that the nails are pigmented. In most cases the nails look relatively white compared with the brown skin of the fingers and this is specially so when *anæmia* is marked. In the dark-skinned races also this relative pallor of the nails compared with the skin is quite marked. A single longitudinal brown band running down one nail in white persons is usually due to a pigmented *nævus* in the nail-matrix and less definite longitudinal lines and bands are fairly common in the nails of the coloured races.

The slate-blue discoloration of the skin in *argyria*, usually most marked on the exposed parts, is very disfiguring. It is due to the deposit of metallic silver in the epidermis and true skin. The same discoloration occurs in the nail-beds and, as it may be the earliest manifestation of *argyria*, it should always be looked for. If found, the administration of silver, whether externally or internally, should be stopped at once before the skin has become permanently discoloured.

In cases of *chronic mercurial poisoning* a brownish-black discoloration, much darker than in *argyria*, may occur. It is due to the formation of sulphide of mercury in the tissues. A blue-black discoloration of the nails due to *hæmorrhage* under them is very common. It is most often due to an injury, but in bleeding diseases, such as purpura, *hæmophilia* and scurvy, spontaneous *hæmorrhages* may occur under the nails, and in these cases they usually occur under several of the nails. In *tuberculosis dorsalis* also *hæmorrhages* may appear suddenly in all the nails of the toes in association with lightning pains. *Hæmorrhages* under the nails, preceded by neuralgic pains, may also occur in diabetes.

If the *hæmorrhage* in these cases is extensive the pressure of the blood enclosed under the nails may cause considerable pain which can be relieved by drilling holes in the nails. In severe injuries with *hæmorrhage* the nail may become loose and be shed some weeks later, but in most cases the blue-black mark gradually moves down the nail till it disappears at the tip. It takes about five months for such a mark to travel the whole length of the nail.

A jet-black discoloration of the nail occurs in diabetic and other forms of *gangrene*, but as the whole of the tip of the finger or toe is usually affected the black discoloration is not limited to the nail.

CHANGES IN SHAPE

Apart from any alteration in colour the nails may become altered in shape and size in various ways. *Clubbing* of the fingers and toes in chronic pulmonary and cardiac conditions is well known, and when that occurs the nails become curved from above downwards and from side to side. The opposite condition may also occur when the nails are either flat or hollowed

out, producing what is known as *spoon-nail* (*koilonychia*). In it the nail-plate is concave instead of being convex. In mild degrees of the condition the nail is merely flatter than normal, but in fully-developed cases the centre of the nail is concave whilst the lateral edges and free margin are slightly raised and projecting. The surface of the nail is usually smooth, but some degree of longitudinal lining may be present. The edges of the nail-plate are somewhat thickened and raised up off the nail-bed. All the nails may be definitely affected, but in mild degrees of the condition the change is limited to the thumbs and forefingers. In patients who suffer from alopecia areata a flattening or slight concavity of the nails of the forefingers and sometimes also of the middle fingers and thumbs is very common. The cause of spoon-nail is not known. It may occur in association with nutritional anemias. As most of the persons in whom it occurs are of the highly-strung type, the nervous system may play some part in the etiology.

Fragility and splitting of the nails is another fairly common condition. Some persons are born with nails which are brittle and tend to split and break off at the free ends. A similar condition may also be acquired by prolonged contact with chemicals, especially alkalis, used in the course of work. By too frequent manicuring or the application of chemicals to remove coloured nail-enamels women may cause a softening and splitting of the nails. There is also the condition known as egg-shell nail in which the nail-plate is soft, semi-transparent, bends easily and splits at the end. This particular change has been reported in association with arthritis, peripheral neuritis, leprosy, and hemiplegia. A somewhat similar condition also occurs occasionally in late syphilis, producing onychia syphilitica sicca. In this condition all the nails are affected. They are dry, atrophic and tend to split. It may be the only visible sign of syphilis, but the diagnosis can be confirmed by the Wassermann reaction.

As it has been shown that the keratin of the nail has a high sulphur content the administration of sulphur is indicated in all the atrophic conditions of the nails.

LINES OF THE NAILS

Longitudinal striation of the nails is a very common condition in adults past middle life. In slight cases it is merely an exaggeration of the normal longitudinal ridges of the nail-bed, but in well-marked cases it is accompanied by splitting of the nails (onychorrhexis) at the free margins, it is common in persons who are absorbing from a focus of infection at the root of a tooth or in the bowel.

One of the most marked cases of this condition which I ever saw was in a patient who was discovered to have a chronic abscess of the appendix. When this was opened and drained all the nails became loose, fell off and were replaced by normal smooth nails.

In addition to cases due to focal infection lining of the nails is seen in gout and nervous diseases such as neuritis and hemiplegia. It is also associated with the dry skin and scanty hair of myxoedema. Dryness of the skin, with lustreless nails showing longitudinal or transverse lining, is also seen in cases of vitamin-A deficiency. Similar changes in the nails have also been recorded in deficiencies of vitamins B and D. Administration of the appropriate vitamins in these cases will restore the nails to normal.

In all these cases, in which the splitting of the ends of the nails is marked, the condition might be confused with ringworm of the nails, in which the nails also split and break off. In ringworm all the nails are practically never affected. There are always some of the nails which are quite normal. If there is any doubt, examination of pieces of the splitting nail under the microscope will reveal the fungus in such cases.

A single raised *longitudinal ridge* running down one nail only is fairly commonly met with. This is the result of a scar at the base of the nail from previous disease or injury. As the line of the nail-fold at the base of the nail is puckered and irregular from the

presence of the scar the origin of the ridge is easily recognized. There is also a rare congenital family defect of the nails in which all the nails of the hands and feet show an atrophic condition with a definite raised longitudinal ridge running down the centre of each nail. It looks as if each nail had been gripped with a pair of forceps and squeezed so as to make the centre rise up into a ridge. This condition, curiously enough, is always accompanied by complete absence or extreme smallness of the patellæ. Why this should be and what the connection is between the nails and the patellæ is not known.

Almost as common as longitudinal lining of the nails are transverse lines, usually known as *Beau's lines*. They appear on the nails as a result of previous interference with the growth of the nail-matrix. They consist of a superficial depression running across each nail. Appearing first at the base, as the nail grows, they slowly move along the nail-bed till they disappear at the tip of the nail. As a complete nail takes from five to six months to grow, one can calculate from the position of the line when the lesion occurred. These lines may be due to a local cause, in which case all the nails are not usually affected, or to some general disturbance in which all the nails of the hands and feet are equally affected. The local causes are inflammatory lesions in the region of the growing nail-matrix as in eczema, psoriasis, general exfoliative dermatitis (especially after the administration of arsphenamine preparations), paronychia, and trauma. Of the general causes the commonest are acute infections, such as erysipelas, influenza, pneumonia, scarlet fever, measles, and typhoid fever; but any condition in which the general vitality is temporarily lowered, such as from loss of blood, especially at confinements, prolonged and severe sea-sickness, nerve shocks, epileptic attacks, exophthalmic goitre, and diabetes, may cause Beau's lines to appear. When the causative factor is repeated a succession of these lines may result and the distal part of the nail may become loose and drop off.

SHEDDING AND ATROPHY

Shedding of the nails without any previous alteration in them or in the skin around them may also occur. Certain individuals shed their nails regularly once a year for no apparent reason. Many of these cases have a family history of this peculiarity. In *epidermolysis bullosa*, in which trivial injuries give rise to the formation of large blisters in the skin, the nails frequently fall off, presumably after previous slight injuries. The nails may also be shed after fevers, especially scarlet fever, in tabes dorsalis, and in diabetes. In extensive skin diseases, such as exfoliative dermatitis, pemphigus foliaceus, extensive eczema, and alopecia areata, a similar loosening and shedding of the nails is apt to occur. In all these conditions the nails grow in again completely.

Another frequent change in the nails is atrophy. The nails become small and mis-shapen, so that only a deformed or thinned stump is left to represent them. Some degree of atrophy is nearly always present in the nails of the third, fourth, and fifth toes. This is probably due to the constant wearing of shoes. Sometimes atrophic nails may be a congenital condition in which only traces of nail substance are seen. It is usually associated with other ectodermic defects such as extreme thinness or absence of scalp hair. Such persons have difficulty, owing to the absence of the nails, in picking up small objects and doing certain forms of work such as sewing. Although not necessarily associated with any mental condition this change in the nails is fairly frequently seen in mentally defective children. It may also be an acquired condition and may follow injuries, scars from disease, frostbite, sclero-dactylia, Raynaud's disease, dermatitis, and syphilis. It also occurs in hyperthyroidism and exophthalmic goitre and has been reported after nerve injuries, in leprosy, tabes dorsalis, syringomyelia, and in prolonged debilitating diseases such as cancer. Another of the rarer causes is tetany following destruction or extirpation of the parathyroids.

In all these conditions the atrophy of the nails is permanent.

An appearance of atrophy of the nails may be produced by the patient. In cases of nail-biting the nails may be so bitten down that they look small and atrophic. The skin around them is often swollen and inflamed so that the nails appear to be sunk below the normal level and look smaller than they really are. There is also another condition allied to nail-biting which is usually seen in adults of nervous temperament. These persons are constantly picking at the free edges of their nails, so that small pieces become chipped off, making the nails much shorter than normal. In all prolonged itchy skin diseases, such as chronic eczema and neurodermatitis, the nails of the fingers may be worn down at the tips to a straight line or even show a concavity. This is due to the constant scratching. In addition to the alteration in the shape of the nails the surface becomes smooth and burnished from the constant rubbing. It is a very good index of the amount of scratching indulged in by the patient.

THICKENING AND HYPERTROPHY

The last condition which must be mentioned as of diagnostic value is a thickening and hypertrophy of the nails. It occurs in four groups: (1) simple thickening of the nail substance, (2) subungual hyperkeratosis, (3) thickening in chronic nail inflammations, and (4) onychogryphosis.

In *simple thickening* the nails become gradually thicker and thicker towards the free ends so that a very hard horny peg, greenish or blackish in colour, is produced. The surface of the nail is smooth and regular or only slightly longitudinally lined. Congenital cases of this condition have been recorded, but in chronic eczema with hyperkeratosis of the palms and soles this nail change is not infrequently seen.

In *subungual hyperkeratosis* a horny mass grows from the nail-bed and pushes up the overlying nail-plate. This change may occur by itself, but it is usually an accompaniment of a chronic skin disease such as eczema and psoriasis. If it occurs unaccompanied by a local skin eruption the possibility of its being due to chronic arsenical poisoning or general paralysis should always be remembered. The horny mass under the nail is usually fairly soft and can be scooped out. The condition must not be confused with yeast infections under the nails, in which the nail always has a dark greenish or bluish colour and the material which can be scooped out from under the nail is much softer than in hyperkeratosis. Examination microscopically and by culture will also show the presence of yeasts.

In all *chronic inflammations* of the nail-bed and infections of the nail-folds round the nails there is a gradual overgrowth of the nail substance so that the nail becomes considerably hypertrophied. This usually occurs irregularly, producing lumpy thickening of the nails. It is seen in ringworm of the nails and in all types of paronychia and naturally its treatment should be that of the condition causing it.

Of all the hypertrophies of the nail one of the commonest and most striking is *onychogryphosis*. It may affect all or only a few of the nails. In nearly all cases it is limited to the toe-nails and is especially apt to affect the nail of the great toe. Whenever it occurs on the finger-nails the practitioner should always eliminate syphilis by having a Wassermann done. In onychogryphosis the nail becomes greatly overgrown and irregularly thickened. It is usually of a brownish, greenish, or blackish colour and as it grows it becomes bent over and curved like an animal's horn. It is so hard that the patient cannot cut it, so that it is often allowed to grow to great lengths. It is found usually in elderly persons and may be associated with deformities of the toes, especially hallux valgus. It has been noted in association with peripheral neuritis, leprosy, tabes, and hemiplegia. Pituitary and thyroid dysfunctions may be responsible for a very few cases, but in the majority of cases there is no evident cause except want of cleanliness and neglect.

Ulcerative Colitis

By STANLEY O. AYLETT, B.Sc., M.B. (Lond.),
F.R.C.S. (Eng.)

(From the *Medical Press and Circular*, Vol. CCII,
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THE many theories as to the ætiological cause of this condition and the many methods by which it is treated are indicative of our lack of knowledge of the condition and disappointing results often following its treatment. And yet, although by many it is regarded as a hopeless and intractable condition, treatment along various lines and the liberality of mind to change one specific method, if that is not suitable, will yield dramatic improvements, and often cures.

Ulcerative colitis is an inflammatory condition extending either the length of the colon or sometimes limited to its lower part only. It tends to run a prolonged and chronic course, often with sub-acute exacerbation, although the onset of the disease is sometimes acute. Death may result from complications such as hæmorrhage, perforation into the peritoneum or general exhaustion and toxæmia.

Various organisms, such as the staphylococcus, streptococcus, pneumococcus, *B. proteus* and *B. pyocyaneus*, have all been isolated from the stools, but it is very doubtful whether these are primary causative organisms or whether they are responsible for secondary invasion. There does seem no doubt, however, that the pneumococcus can give rise to a form of ulcerative colitis associated with the discharge of the rather typical greenish pus, and Lockhart-Mummery has recorded a case in which, following appendicostomy for the condition, the wound around developed an infection from which the pneumococcus was isolated.

Some of the cases have had in the past a dysenteric infection and in others, even without a previous history, the dysentery bacilli are probably the offending organisms, as treatment with polyvalent antidyenteric serum produces rapid improvement. But in the majority of cases it is impossible to find any bacteriological or serological evidence to support the view expressed by some that the dysentery bacilli are the usual cause of ulcerative colitis.

The same applies to the amœba. There is no doubt that some cases of ulcerative colitis are the result of an amœbic infection which has been missed, and Trudkin has described a case which for twenty-eight years had been treated as a non-specific ulcerative colitis but in which, by examination of material aspirated from an ulcer, the amœba was isolated. Treatment with emetine injection cleared the condition, but it is hardly fair to suggest that the majority of other ulcerative colitis cases may be due to a missed amœbic infection, especially in view of the fact that emetine rarely produces good results.

Bargen has brought forth abundant evidence that the disease is due to diplostreptococcus which in some eighty per cent of cases at the Mayo Clinic, he has been able to isolate from the bowel. In some severe cases he has been able to grow this organism from the blood, and intravenous injection of the organism has in animals, he states, produced lesions akin to those occurring in the human colon. It is fair to state, however, that many investigators believe that these lesions are not identical with those of ulcerative colitis and can be produced by the injection of a variety of organisms into the blood stream. Bargen believes that the origin of these diplostreptococci is in the upper air cavities, such as the sinuses, the tonsils and the teeth, and has isolated the organisms from such situations. It is well known that an accentuation of the disease, with perhaps death in some cases, may ensue on such operations as tonsillectomy or the extraction of teeth in cases suffering from ulcerative colitis, and this he believes to be due to a sudden liberation of these organisms which have previously been fairly well limited in these situations by the reaction of the body.

By immunizing horses against a variety of strains of the diplostreptococcus he has produced a polyvalent antiserum which, injected intramuscularly, or in severe

cases intravenously, in small doses starting with 1 cubic centimetre have produced good results. These results from the serum in other hands, however, have not been reproduced, and in an extensive trial at the Gordon Hospital much disappointment was experienced.

Some workers have tried to incriminate a deficiency in vitamins, especially vitamin A, as the causation of the disease, as there is ample evidence of the failure of the absorption of these and other essential food substances in severe cases, but, as Bargaen rightly points out, these theorists are probably putting the proverbial cart before the horse, as owing to the pathological changes occurring in the colon and the rapidity with which the whole intestine evacuates, the deficiency is the result of the condition, not the condition of the deficiency.

An attempt has been made to incriminate the internal secretions of the ductless glands, but without any definite evidence.

One thing is certain, however, and that is that worry, anxiety and shock undoubtedly increase the severity of the condition. In the September crisis we were impressed with the large number of cases which returned to the Gordon Hospital, cases which had been previously restored to a fair degree of good health. One Jewish refugee from Austria had been free from symptoms until he suddenly learnt of the removal of some of his friends by the Nazis, when immediately all his old trouble recurred.

The disease is rare in children, in whom a poor prognosis must be given, most cases occurring round about the age of thirty. Occasionally a minor epidemic of the disease is noted, as occurred recently in a prominent public school. I had occasion to see two previously-fit young men who went on a camping holiday in Scotland and drank some unboiled stream water. Both developed on their return typical ulcerative colitis, from which no specific organisms could be cultured. It seemed here that undoubtedly the source of infection was an extraneous one, probably infected water.

The patient comes up complaining of the onset of diarrhoea, associated with the passage of blood and pus, the blood sometimes being mixed intimately with faecal material, and in other cases appearing in jelly-like clots. There is often associated dull aching pain in the abdomen, but tenesmus, except in cases where the rectum is grossly involved, is conspicuous by its absence. The diarrhoea is not such in the true sense of the word, because most times it consists of the mere passage of blood and pus, and in some cases the bowels may actually be constipated. Eight to ten visits to the closet are common and, in severe cases, twenty or more may be reported each day. There is general malaise and feeling of listlessness and exhaustion, increasing anaemia and loss of weight and appetite, and all reflecting themselves in the pale, rather muddy appearance of the skin and the worried expression that the patient presents to the physician. The pulse is raised and the patient often runs a fluctuating temperature of some 100° to 101°.

Although the history is suggestive of the nature of the complaint, a thorough examination must be completed as in some cases carcinoma low down in the sigmoid, or more commonly in the rectum, gives similar symptoms. The abdomen is usually found slightly distended in both conditions, and a contracted and painful iliac colon is often palpable in ulcerative colitis. Rectal examination, if that part of the intestine is affected, will reveal to the experienced touch a saggy, rather oedematous mucosa, and, on withdrawal of the finger, it is seen to be covered with blood and pus. Sigmoidoscopy and x-ray examination should always be carried out. The former investigation is usually regarded as the province of the specialist, but a little practice in less difficult cases to examine soon gives the investigator facility with this instrument. Any of the common forms, such as Yeoman's or Morgan's, may be used, and the patient should be examined in the right lateral position, this tending to straighten out the pelvic colon. An anesthetic is unnecessary in most cases, but a preliminary washout some hours before is

of value. The essential point in using a sigmoidoscope is never to press even gently on the instrument unless the lumen of the bowel is always in view. If this point is remembered there is no likelihood of pushing the instrument through the wall of the bowel. Usually the scope can be passed to a distance of about 10 inches or so, the limit being reached at the right angled bend of the pelvic colon. Obviously, as the colon bends abruptly through 90 deg., no lumen, when this point has been reached, will be visible and no effort must under any circumstances be made to pass beyond this level.

In the early stages the bowel wall is seen to be red and inflamed with small areas of hæmorrhage and ulceration. In later stages the ulcerated areas are increased in size, oozing pus and blood, and if gently swabbed with cotton-wool granulating areas will be seen. So extensive may this ulceration be that little mucosa is left, and most of the surface is covered with necrotic tissue.

Radiologically the colon appears to be rather spastic with a loss of the haustrations normally seen, and often an irregular margin, due to the ulceration present, is observed.

It is advisable to do a blood count and hæmoglobin estimation and, in addition, a fractional test meal should be carried out as in some cases there is hypochlorhydria.

TREATMENT

The mildest of these cases should be treated with respect. Investigation of material obtained from swabbing the ulcers or examination of the faeces will eliminate such specific causes as the amoeba or the dysentery bacilli, which will respond to appropriate treatment.

There is no doubt that these cases best respond if, when initially seen, a period of bed is advised—warmth, rest and freedom from worry being essential adjuvants to recovery. The diet must not be reduced for long periods to too low a level as this will only accentuate the wasting, but nutritious low residue food given at frequent intervals should be ordered. It is argued by some that within limits the diet makes no difference, as the residue, by the time the colon is reached, from a mutton chop is probably no more than from a glass of Bengers. This may be true of the normal intestine, but where the rapidity of evacuation is so markedly increased, as in most cases of ulcerative colitis, it certainly does. Periodic confinements of the diet to fruit juice and bland fluids only for a couple of days are of value.

Various drugs may be tried, such as belladonna, to reduce the spasm of the gut, small doses of opium to diminish the constant diarrhoea, and kaolin also is of value in this respect. In those cases where constipation is an association of the condition, we have found Kaylene Ol. of value. Prontosil has been tried with apparent improvement in some patients. Red gum, gr. x, t.d.s., is also worthy of trial. In an endeavour to alter the flora of the intestine lactic acid bacilli have been introduced, and one of the best forms of administering these is by means of lactol tablets. Two of these should be dissolved in a little milk, or some milk sugar, overnight and the mixture drunk the following morning. A starch and opium enema is another method of attempting to control the diarrhoea.

The use of Bargaen's serum has been referred to and vaccines made from any diplostreptococci isolated from the bowels should be given after this. Blood transfusions in some cases work wonders.

A search should be made for any focus of infection in the teeth, the tonsils or the sinuses, but active intervention should be resisted until some alleviation of the condition has been obtained as a severe and perhaps fatal flare up may result if treated during the active phase.

There is no doubt, however, that the bulwark of treatment lies in colonic lavage, and to be of value must be efficiently carried out. A large container holding about a gallon and a half of fluid is suspended some two feet above the level of the patient's buttocks,

the patient lying on a couch in the left or right lateral position. The rubber tube from the container is connected to a large bore T-shaped glass tube the vertical limb being attached to a tube running into a bucket, and the other horizontal limb to a large bored rectal tube, which, after being greased, is inserted three or four inches inside the rectum. At first only a few ounces of fluid are allowed to run in, the tube leading to the bucket being compressed. This is then released and compression exerted on the tube leading to the container, so that the fluid runs out from the patient's rectum through the rectal tube and enters the limb of the T-shaped tube and thence into the bucket. When the washout from the lower part of the sigmoid and rectum is returned clean, irrigation is carried out farther up by allowing more fluid, up to about three-quarters of a pint, to flow in gradually, and this is then allowed to return. Never must fluid be run in to the extent of causing the patient more than slight discomfort as it is possible by so doing to rupture the bowel.

As regards the fluids used for irrigation, in the very severe types probably normal saline is best. This should be followed by such antiseptics as Albargin 2 per cent, Yatren 2 per cent, Dettol drachms 1 to 2 pints of water, or potassium permanganate in 1 in 10,000 strength. We have obtained good results in some cases using a solution of adrenalin drachms iii to iv to a pint of saline, and others report equal satisfaction using cod-liver oil. The frequency of the washouts must be controlled by the course of the disease, daily irrigations being given in the severe cases, this being reduced gradually until perhaps the patient has a treatment once or twice a fortnight.

Surgical interference, which will take the form of an appendicostomy, is advised by some at an early stage in the disease in order that the bowel can be irrigated more thoroughly, but we believe that efficient colonic irrigation in most cases is equally satisfactory. Rarer complications, such as stricture or multiple polyposis, may also require surgical intervention, but these are only seen in later cases. Perforation, of course, will require immediate laparotomy.

The treatment of this complaint will require a degree of patience and perseverance that would tax that of Job himself, but the results, if not in every case cures, are worthy of time laboriously spent.

A Study of the Economics of Pneumonia: The Costs of Diagnosis and Treatment of 625 Cases in New York City

By J. HIRSH

(Abstracted from the *Public Health Reports*,
Vol. LIII, 9th December, 1938, p. 2154)

BOTH medically and economically pneumonia is a disease attendant with serious consequences. It accounts for well in excess of 450,000 cases of illness a year in the United States, approximately 25 per cent of which are fatal. This toll exceeds that of any other communicable disease.

In an effort to determine the amount and nature of the costs of diagnosis and treatment incurred by pneumonia patients, a study of the records of 625 pneumonia cases in New York City was undertaken.

1. The median total cost of pneumonia treatment for our whole group of patients was \$34.16. Hospitalization constituted 42 per cent of the total cost for all cases; physicians' services, 28 per cent; serum therapy, 16 per cent; and other services, 14 per cent.

2. The following median costs illustrate the wide range between different types of accommodation: Ward, \$123.64; semi-private, \$183.14; private, \$224.08; home, \$93.04.

3. If the total cost is divided according to the type of services rendered, we find that for ward cases, hospital care constituted 40 per cent of the total; for semi-private, 53 per cent; for private, 50 per cent. Physicians' services comprised 22 per cent of the total ward cost; 26 per cent of the semi-private; 35 per cent of the private; and 62 per cent of the home. Serum

therapy comprised 24 per cent of the total ward cost; 11 per cent of the semi-private; 5 per cent of the private; and 10 per cent of the home. The cost of other services constituted 15 per cent of the total for ward cases; 10 per cent for semi-private; 10 per cent for private; and 28 per cent for home.

4. The median cost of hospital care for ward patients was \$50.75; for semi-private patients, \$98.45; for private patients, \$116.

5. The median cost of physicians' services in the different accommodations was as follows: Ward, \$34.60; semi-private, \$123.75; private, \$141.28; home, \$94.18.

6. The median cost of serum for those cases receiving it was: Ward, \$59; semi-private, \$85; private, \$50.40; home, \$37.50.

7. Approximately one-third of the cases studied had total costs less than \$100; another third between \$101 and \$200; one-third from \$201 to over \$451. This last group included several unusually high-cost cases, mounting to over \$1,550 in one case.

8. In the hospitalized cases, with the exception of the ward cases, the two major items of cost are hospitalization and physicians' services. The cost of the latter, however, is much less than the cost of hospitalization.

9. For the ward cases, serum therapy constituted a larger portion of the total cost than physicians' services.

10. Two major items comprise almost the total cost for home cases—physicians' services and nursing care. The reasons for this are (1) that there are no hospitalization charges, and (2) that the treatment is usually symptomatic, with the result that the expenditures for serum and other special therapies have been practically nil.

11. The large low-cost group is principally the result of the great proportion of fatalities early in the course of the disease. Seventy-six per cent of the total number of deaths in the hospitals occurred within the first 5 days.

[This abstract is included for the benefit of medical officers who receive complaints regarding the high cost of the treatment of pneumonia in India; they may find these figures useful for quoting to those who control their funds.—*Editor, I. M. G.*]

Reviews

THE BRITISH ENCYCLOPÆDIA OF MEDICAL PRACTICE: INCLUDING MEDICINE, SURGERY, OBSTETRICS, GYNÆCOLOGY AND OTHER SPECIAL SUBJECTS.—Under the General Editorship of Sir H. Rolleston, Bt., G.C.V.O., K.C.B., M.D., D.Sc., D.C.L., LL.D. Butterworth and Company, Limited, London. Sold in complete sets only. Cash price, Rs. 25 per volume. Also available on the instalment system at Rs. 26-8 per volume. Payable Rs. 10 monthly. Only available from Messrs. Butterworth and Company (India), Limited, Calcutta. Volume XII. Pp. xix plus 672 plus 54. Illustrated

THIS is the twelfth and, of the initial series, the last volume, but the general index and addendum is still to come, and then we are promised an annual volume of recent advances. The present volume starts with tetanus and ends with yellow fever; the Zondek-Aschheim test was described under 'pregnancy' and for 'Zoster see herpes'.

From a tropical point of view it is an important volume. There is first of all a chapter headed tropical diseases. In this Sir Leonard Rogers describes the distribution of general diseases in the tropics. This is in some ways disappointing but through no fault of the writer: over twenty years ago, before he left India, he collected data from necropsies in Calcutta which he analysed and, if this chapter is mainly based on this analysis, it is because others have not followed his example and provided the data for a more comprehensive survey. The moral however is there, namely,

that most cosmopolitan diseases which were supposed to be rare in the tropics are not rare and often more common than they are in temperate climates. Nearly every crank who has a ridiculous theory on the causation of cancer starts with the false premise that it is rare amongst coloured races, or 'natives' as he usually calls them, and the fallacy that typhoid is rare amongst Indians is dying hard, even in the best textbooks on tropical medicine. In the same chapter there are short references to 'minor tropical diseases': the 'minority' depends of course on the point of view, for chinia, which, according to the information given here, is usually fatal in 3 days, will scarcely be considered 'minor' by the sufferer. Jhin-jhinia was not included in this chapter!

Another tropical disease, undulant fever, is dealt with by General MacArthur: as abortus fever was included in the first volume, this one refers only to melitensis and suis infections. This is not an entirely satisfactory division as from many points of view suis infections go better with abortus infections. The present chapter is however a very comprehensive one and, if the writer has not been very explicit about the treatment by the sulphanilamide group of drugs, he has the excuse that they have been introduced so recently that they have scarcely found their proper place in the treatment of these infections.

There is an excellent article on trypanosomiasis by Dr. Warrington Yorke of the Liverpool School of Tropical Medicine. He has made a life study of this disease and is still actively engaged in research on trypanosomicidal drugs. Other tropical conditions included in this volume are tropical ulcer by Dr. D. N. Roy of the Calcutta School of Tropical Medicine, who gives a well-balanced account of this disease the exact aetiology of which is still doubtful, veldt sore by Dr. W. H. Craib of the Witwatersrand University, typhus fevers by Sir John Megaw, who when he was in India was a pioneer in the study of tropical endemic typhus, which is now recognized as a widespread infection in India, and who also writes on trench fever another rickettsial infection, yaws by Dr. H. S. Stannus, on whom one can always rely for a good summary, though in this instance he has been generously treated in the matter of space and has given a comprehensive account of the disease in about 30 pages, and finally yellow fever by Dr. Manson-Bahr, who has given a more concise but a very satisfactory account of this disease.

Trachoma is a disease whose distribution is largely tropical, but it also occurs in poor and sanitarially backward countries of the temperate zones. Dr. A. F. MacCallan, whose name is associated with the operation that is now widely practised for the cure in the chronic stages of this infection, is the writer of this article. We offer this criticism with the utmost respect and with the full appreciation of our lack of expert knowledge. But is it quite a fair appraisal of recent work to dismiss the sulphanilamides with the remark 'It has recently been stated that sulphanilamide and its congeners have a beneficial effect on trachoma and that they inactivate the trachoma virus. It is clear, however, that they cannot remove the new fibrous tissue which pervades and thickens the pretarsal and tarsal structures and which characterizes trachoma'. But, if they do inactivate the trachoma virus (we, in our ignorance, don't know whether this is a fact or not) surely a very great advance has been achieved, in cutting short the pathological processes and in preventing the spread of infection.

Amongst non-tropical subjects there are some very important contributions. The section on toxicology amounts to a small textbook on this subject. It is divided into two portions, homicidal, suicidal and accidental, and industrial. The growth of the second half of the section, which is the larger of the two, forms an interesting subject for a commentary on social trends since the days of the Borgias. This should prove an invaluable chapter for the general practitioner who must always be on the look out for symptoms of poisoning which may be associated with the patient's

work. In the first half of the chapter, the authors—Drs. G. Roche Lynch and D. M. Pryce—mention the traditional poison, powdered glass, only to express scepticism as to its efficacy; they refer also to powdered diamonds about which they remark, laconically, that it is 'little used now on account of expense'. Such are the results of present-day economic stress.

Another very useful chapter is on the vitamins by Dr. Leslie Harris. It is only in the specialist books on the subject of dietary that one will find this information, but there, even if the practitioner can afford to buy such books, he will not find the information so well digested and presented in the concise form in which Dr. Harris has given it in this article.

It will not be necessary to add anything further to show that this is perhaps the most interesting volume of the series, particularly from the point of view of the practitioner in this country.

ANGINA PECTORIS. NERVE PATHWAYS, PHYSIOLOGY, SYMPTOMATOLOGY AND TREATMENT.—

By H. R. Miller, M.D. 1939. Baillière, Tindall and Cox, London. Pp. xvii plus 275. Illustrated. Price, 15s.

IN this book the author has discussed the subject of anginal pain, its clinical features, nervous pathways, treatment and physiology of pain.

The book is divided into four sections; the first deals with the concept and clinical features of angina pectoris, the second describes the anatomical pathways of cardio-aortic pain, and contains a large number of excellent drawings of these pathways. These drawings form an interesting feature of the book. The third section contains the distribution or reference of anginal pain, simulation of anginal pain, and treatment of angina pectoris, both non-surgical and surgical. The fourth section deals with the physiology and psychology of pain, particularly cardio-aortic pain.

The author is of opinion 'that angina pectoris represents a powerful disturbance of the entire autonomic nervous system and that each sub-division, the sympathetic and the vagus, functions as a unit and as if its central nucleus were set into action', and 'from a chemical point of view the anginal paroxysm may be considered as partaking of sudden or excessive acetylcholine (cholinergic) mass action on whole organs and systems, evoking in the vagus and sympathetic innervations (perhaps in some of the somatic nerves as well) responses that belong to and are characteristic of each system respectively...'. To him the separation of acute coronary occlusion and non-coronary angina pectoris as entirely separate entities is an oversimplification, and he can not reconcile himself 'to a sharp distinction between coronary artery occlusion and so-called angina pectoris on the sole basis of a causative anatomical lesion in the former and merely anoxæmia of the heart muscle in the latter'.

The reviewer, who has been taught to recognize these two clinical entities as distinct from each other, does not feel convinced with the arguments of the author, and feels that, both on a clinical and an anatomical basis, the differentiation of angina pectoris from acute coronary occlusion is a necessity and the use of the term 'angina pectoris' should be restricted so as not to include conditions like acute coronary occlusion.

To the cardiologist this book will be of interest as it presents the views of one who prefers 'to consider angina pectoris a paroxysmal upheaval of central origin, and this whether the individual has normal or abnormal coronary vessels'.

P. C. S. G.

PRECLINICAL MEDICINE: PRECLINICAL STATES AND PREVENTION OF DISEASE.—

By Malford W. Thewills, M.D. 1939. Baillière, Tindall and Cox, London. Pp. vii plus 223. Illustrated. Price, 13s. 6d.

THE title of this book is somewhat mysterious but it is certainly original. In this monograph the writer has tried to present an analysis of preclinical states,

i.e., conditions which may exist before the appearance of the actual symptoms and which may therefore be considered as the predisposing factors to the production of diseases. He appears to be a firm believer in the gospel 'Prevention is better than cure' and we are certainly in full agreement with him. The author thinks that by a careful study of these factors it is often possible to correct a soil which may, over a period of years, condition a person for disease. It should also be our object to discover such a soil early and correct it as far as possible so that disease may not occur, or, if it occur at all, it will not be so bad. His methods consist of recording of personal and family histories of the patient, a study of the inherited constitutional factors and a thorough examination of the patient including a proper appreciation of the minor symptoms and the application of useful laboratory tests. Suggestions for treatment have also been given. At the end of each of the long chapters there is a summary which will be welcome to all readers. An excellent bibliography, though mostly American, has been inserted at the end of the book for easy reference.

Although the author's theme is the study and treatment of preclinical states, he has, at times, transgressed considerably into the symptoms of disease. This, of course, he has explained in the preface. But while going through the pages of the book one noticed many things which the author might seriously consider for the next edition. On page 14, he calls the zygote an unfertilized egg. On page 41, he says that many cases of pneumonia ended by death on the second or third day are acute tuberculous in nature. This is difficult to reconcile with clinical experience. The author appears to have imbibed inspiration from his countrymen regarding the prevention and control of amœbiasis and says that administration of liver extracts or raw liver not only arrests amœbic process but completely eradicates the infection. Such a dogmatic statement is difficult to accept. On page 71, he makes an announcement that œdema due to organic heart disease often disappears after the use of vitamin B₁. We bow down to none in our appreciation of the vitamins, but even the worst vitamin-maniac amongst us will be surprised at this statement. On page 121 he says 'many women use pregnancy as an excuse to eat as much as they desire'. We are sure no member of the softer sex, not even of his own country, will thank him for such an uncharitable reflection. On page 153, under the heading of 'hereditary influences', the writer has included many diseases which have certainly no such relationship.

However, the author deserves our warmest congratulation for presenting a novel way of dealing with the prevention of diseases. The book contains some useful and interesting observations for which it may be recommended to those who are interested in the preventive aspects of human diseases.

M. N. D.

THE SCHIZOPHRENIFORM STATES—A KATAMNESTIC STUDY BASED ON INDIVIDUAL RE-EXAMINATIONS—WITH SPECIAL REFERENCE TO DIAGNOSTIC AND PROGNOSTIC CLUES AND WITH A VIEW TO PRESENTING A STANDARD MATERIAL FOR COMPARISON WITH THE REMISSIONS EFFECTED BY SHOCK TREATMENT.—By G. Langfeldt, M.D. 1939. Oxford University Press, London, Humphrey Milford. Pp. 134. Price, 10s. Obtainable from Oxford University Press, Bombay and Calcutta

THIS brochure embodies further research on the part of the author into the problem of schizophrenia and is a sequel to his former publication, *The Prognosis in Schizophrenia*, a review of which appeared in the *Indian Medical Gazette* in 1938. Like its precursor, the present work is one of extreme importance. The author's research took the form of a personal examination of 100 cases discharged from the University Psychiatric Clinic in Oslo, at the most twelve and at the least six years after their discharge. The object of the investigation was to try to ascertain what cases show spontaneous remission without treatment and what cases, by virtue of the manner of their

development and symptomatology, yield a poor prognosis. The author refers to the work of Jacobowsky, Rian and Soininen in which it was shown that those suffering from a typical schizophrenia, that is to say, showing symptoms with manic-depressive features as well as a strong hereditary taint, give the best results. On the other hand, the typical endogenic 'process psychoses' (by which term the author means to indicate schizophrenic conditions characterized by a severe depersonalization syndrome without mental 'cloudiness') do not seem to react favourably to shock treatment. This discovery reveals this modern treatment of schizophrenia in quite another light than that in which it has hitherto been regarded. The author feels convinced from his observations that in many clinics and hospitals patients are treated in an uncritical manner and that frequently to their detriment. The author's conclusions include the opinion that a leptosome body, schizoid character, insidious onset, lack of a precipitating factor, are all unfavourable factors as regards prognosis. On the other hand, a pyknic body, an acute onset, demonstrable exogenic factors and a non-typical 'schizophreniform' symptomatology, particularly the presence of manic-depressive features are, from the standpoint of prognosis, favourable features. Further, the author's observations definitely show that insulin and cardiazol treatment has the effect of only shortening the time taken to recover in certain cases, namely those in which there is severe depression or in which there is cloudiness and incoherence. As in the former brochure the reader finds peculiar words such as 'delir', 'debil', 'intervenient', etc.

O. B-H.

A SURVEY OF CHILD PSYCHIATRY CONTRIBUTED BY CONTEMPORARY BRITISH AUTHORITIES.—

Edited on behalf of the Child Guidance Council by R. G. Gordon, M.D., D.Sc., F.R.C.P. (Ed.). Oxford University Press, London, Humphrey Milford. Pp. xii plus 278. Price, 10s. 6d. Obtainable from Oxford University Press, Bombay and Calcutta

THIS book has been edited by Dr. Gordon on behalf of the Child Guidance Council introduced into Great Britain by the trustees of the Commonwealth Fund of America, ten years ago. At the present moment there are over fifty clinics in active work so that such a thing as child guidance is now accepted by most persons concerned with judicial, educational or social work throughout the country. No less than twenty-one authors have contributed to the book and the reader is presented with a reasonably coherent survey. In his own contribution to the book, Dr. Gordon quite rightly deplores the attitude of the average doctor towards psychiatry. Far too few doctors realize the importance of trying to correlate anatomy, physiology and physical pathology with psychiatry. As Dr. Gordon observes, one of the most important fields of medical research is psychosomatic disease, that is, the production by deranged emotional states of symptoms and syndromes regarded hitherto as essentially physical in origin. As examples of conditions due to deep-seated emotional conflict and distress, Dr. Gordon cites asthma, peptic ulcer and diabetes. Dr. D. W. Winnicott contributes a very interesting article on the psychology of juvenile rheumatism in which he discloses in a very unusual degree an understanding of the effect of 'being ill' in terms of unconscious fantasy. Further, Dr. Winnicott points out how pains and joint troubles can result from the direct action of local and general excitement, acute and prolonged, and of anxiety and rage. He maintains that the common aches and pains of children and grown-ups can be traced to the dramatization of persecutions belonging to unconscious fantasy of what is inside the body. Dr. W. Moodie contributes a valuable study of anxiety in children and adolescents. Dr. Emanuel Miller, an eminent child psychiatrist, is responsible for an illuminating study of obsessional and compulsive states in children. Dr. W. Paterson Brown writes of

what he terms 'the family neurosis' in which he shows to what extent the family is responsible for the creation of a neurosis. He regards the family neurosis as endowed with certain well-defined clinical features and that the mother is the centre-piece of the neurosis, while it is to the father that we must turn when considering the prognosis and treatment. Space does not permit of detailed reference to each contribution to this book, but there can be little doubt that it serves to bring to the notice of the medical profession, particularly the family physician, that the ordinary medical curriculum to-day does not yet afford facilities for acquiring enough psychological knowledge to render the general practitioner of much use in situations of the type here discussed. In India, medical curricula are even more deficient in respect to imparting instruction in psychological medicine than the medical curricula of Europe and the United States, hence this book should be a most valuable addition to the library of doctors trained in medical schools and colleges in this country.

O. B-H.

PERSONALITY CHANGES AFTER OPERATIONS ON THE FRONTAL LOBES—A CLINICAL STUDY OF 32 CASES.—By Gösta Rylander. 1939. Oxford University Press, London, Humphrey Milford. Pp. 327. Illustrated. Price, 15s. Obtainable from Oxford University Press, Bombay and Calcutta

THIS brochure embodies a report on an investigation into the nature of the changes which supervene after partial excision of a frontal lobe. Hitherto reports published on this topic have been extremely varied and frequently contradictory. For the sake of consistency in the technique and the method of judging the cases, consideration had to be paid to special points. For example, complications such as frequent convulsions before or after operation could not be accepted, because of the risk of epileptic disturbances in the character. Patients still suffering from severe aphasic troubles had also to be excluded, because of the necessity of a special method of investigating them and the obscure connection between aphasia and intellectual disturbances. The number of patients chosen amounted to 32. Of these, 31 had been operated on for tumours and 1 for an abscess. In 20 of the cases, the operation involved the left frontal lobe and in 12 the right. With regard to the type of tumour, 12 of the patients had a meningioma and 19 a glioma. The follow-up examinations were carried out from six months to seven years after the operation in the patients' homes. First of all the pre-morbid personality was reconstructed with the help of all available information. With this as a background the post-operative cogitation was then analysed from three different points of view. First, a special scheme was followed containing questions on the patient's life, memory, comprehension, initiative, endurance, working capacity, judgment and general interests. The second step was to analyse the operative sequelæ from the standpoint of the patient himself. The third point of view from which the patient's condition was considered was that of the author himself.

The conclusions drawn from this investigation are that mental changes do occur after excision of parts of the frontal lobe which exhibit themselves in an alteration of personality. Generally they are not of such a degree as to destroy the subject's ability to lead a normal social existence, but they can be fatal to persons doing qualified intellectual work. The brochure is supplied with a copious bibliography pertaining to the matter under consideration.

O. B-H.

MODERN CLINICAL PSYCHIATRY.—By Arthur P. Noyes, M.D. Second Edition. 1939. W. S. Saunders Company, Philadelphia and London. Pp. 570. Price, 22s. 6d.

PSYCHIATRISTS and students of psychological medicine the world over will welcome this second edition of Dr. Noyes' textbook. Each chapter is provided with

a bibliography of its own which is a highly convenient procedure. The pharmaceutical treatment, particularly that involving the administration of convulsant agents, has been brought up to date. The author's views on the therapeutic value of 'shock' treatment are very cautiously expressed. The author holds that psychiatry should be integrated with medicine in all its branches and that artificial distinctions between body and mind should be obliterated. That it should be necessary to-day to emphasize this fundamental principle shows how bad an ear mankind has for new music, although, it must be admitted, this tune is not, after all, so very new. Many psychiatrists have been playing it to their medical, surgical and gynaecological colleagues for at least twenty years. 'How long, oh Lord, how long'?

O. B-H.

MODERN TECHNIQUE IN INFANT FEEDING.—By Lalit K. Mitra, M.B. (Cal.), L.M. (Dub.), D.C.H., M.M. (Lond.). 1939. Published by the author from Child's Clinic, 10, Chowringhee Road, Calcutta. Pp. 133. Price, Rs. 4-8

DR. MITRA has written a book of convenient proportions covering the practical gambit of infant feeding, which may well serve as a guide to the young practitioner embarking on the stormy sea of pædiatrics in India.

The chapters on growth and nutrition of the infant are excellent and the remainder of the text is devoted to a presentation of the more conservative methods of infant feeding.

One might perhaps wish that test feeding and lacticization of cow's milk were given greater prominence: the one as an important guide to the management and adequacy of breast feeding, and the other as an invaluable corrective to minor digestive disturbances during the early months of dentition.

The principle of breast feeding after the sixth month by the middle-class mother in India is open to argument. To many of us who see the effects upon mother and child it is regarded as an economic necessity rather than 'a consummation devoutly to be wished'.

L. G.

AIDS TO ORGANIC CHEMISTRY.—By Stanley F. Smith, M.B., B.S. (Lond.). Second Edition. 1939. Baillière, Tindall and Cox, London. Pp. viii plus 120. Price, 3s. 6d.

THIS handy little volume belongs to the Students' Aid Series which includes many other books on scientific subjects and on almost every branch of medicine. The book is primarily intended to help the student over his initial troubles and then supply a short summary suitable for rapidly reviewing the essentials.

It is divided into 36 chapters, most of which are quite short. The preparation, properties and reactions of most of the important organic compounds are explained briefly by means of equations and structural formulæ, and the student has to study it along with some standard textbook. It is, however, remarkable how the whole of organic chemistry can be revised by a medical student with the help of this book in the course of a few hours and it may truly be said to have bridged the gap between the student and a larger textbook.

S. G.

HUMAN PHYSIOLOGY: A TEXTBOOK FOR HIGH SCHOOLS AND COLLEGES.—By P. Goldthwait Stiles. Revised by G. C. Ring. Eighth Edition. 1939. W. B. Saunders Company, Limited, Philadelphia and London. Pp. 450. Illustrated. Price, 10s.

THE sub-title of this book 'A Textbook for High Schools and Colleges' indicates its scope.

In the reviewer's opinion it completely fulfils its object because it is clearly and simply written and

the many similies exemplified by everyday objects and experience are apt, so that they help to explain in a simple manner the various functions of the body.

It is a book that can be recommended without reserve, because it is felt that any senior school boy or girl who reads this book carefully will have a sound general knowledge of his or her bodily functions.

HEALTH BULLETIN, NO. 18. MALARIA BUREAU, NO. 9. A PRACTICAL ENTOMOLOGICAL COURSE FOR STUDENTS OF MALARIOLOGY.— By P. J. Barraud, F.R.E.S., F.L.S. Second Edition. Revised by I. M. Puri, M.Sc. (Punjab), Ph.D. (Cantab.), F.R.E.S. Published by the Manager of Publications, Delhi. 1939. Pp. 143, with 18 plates. Price, Re. 1-12 or 2s. 6d.

The scope of this invaluable Health Bulletin is expressed in the first few words of the introduction.

'The *Bulletin* has been prepared more especially for use at the malaria classes of the Malaria Institute of India. It is hoped, however, that it may be helpful as a guide to others who may wish to organize malaria classes elsewhere, especially under Indian conditions. The details of practical work and field work, together with the illustrations and explanations, may also prove of practical assistance to workers in the field who may be prevented from attending classes on the subject'.

The book has served its purpose admirably for a number of years and has been used extensively in India, not only by students but by those who have undertaken to train anti-malarial personnel. It was written originally by Mr. Barraud, a former entomologist to the Malaria Institute of India, and is now completely revised by Dr. Puri who holds this appointment at present. This important publication certainly maintains its high reputation.

Abstracts from Reports

THE ROCKEFELLER FOUNDATION, NEW YORK. ANNUAL REPORT FOR THE YEAR 1938

PRESIDENT'S REVIEW

The year in brief

DURING 1938 The Rockefeller Foundation appropriated a total sum of over \$15,000,000. Of this amount, speaking in terms of rough classifications, \$3,800,000 was given to the medical sciences, \$3,800,000 to the social sciences, \$3,000,000 to the natural sciences, \$2,500,000 to public health, \$1,000,000 to the humanities, and \$300,000 to rural reconstruction in China.

The Foundation's income during 1938 amounted approximately to \$7,000,000. In appropriating \$15,000,000 it was necessary, therefore, not only to use up the balance carried over from earlier years, but to dip into the principal fund to the extent of \$3,755,000.

In carrying out its 1938 programme the Foundation operated in forty-two countries in all parts of the world. Eighteen of these countries were in Europe, five in Asia, two in Africa, five in South America, ten in North and Central America and the West Indies, and two were islands of the Pacific.

YELLOW FEVER

Two years ago in this review it was reported that jungle yellow fever, spread by some vector other than the *Aedes aegypti* mosquito, had been discovered in wide areas of South America. In the last two years outbreaks of this disease have been observed from 7° 30' North Latitude to 27° South Latitude; from the eastern slope of the Andes to the mouth of the Amazon; at altitudes varying between sea level and 5,000 feet; in regions of dense jungle growth and in prairie districts where the infected forests cover not more than 5 per cent of the land area; in sparsely populated regions and in heavily populated agricultural districts; in the form of epidemic waves and under conditions suggesting permanent local endemicity. Jungle yellow fever has proven to be not only a constant source of virus for the reinfection of towns but also an important public health problem in its own right.

In any discussion of jungle yellow fever emphasis must be given to the fact that this term is one of epidemiological significance only. Clinically, pathologically, and immunologically, it has so far been impossible to differentiate jungle yellow fever from the classical *aegypti*-transmitted variety.

Field observations have, during the past four years, failed to indicate that any of the minor *aegypti*-transmitted outbreaks during this period have been due to virus coming from a previous *aegypti*-transmitted infection. Rather these observations have suggested

in each instance that the town had been invaded by a virus from near-by jungle districts. Were it not for the existence of the jungle infection, yellow fever might have disappeared permanently from the Americas in 1934. Although the clinical picture of yellow fever is the same whether the infection develops in the town or in the jungle, the epidemiology of the two types is quite different. *Aegypti*-transmitted yellow fever is generally acquired indoors; it tends to involve all non-immunes of all ages living in infected houses, and spreads from place to place along the routes of human travel. The disease follows a mosquito-man-mosquito cycle and is easily controlled by reduction of the numbers of the mosquito vector.

Jungle yellow fever, on the other hand, is usually acquired in or at the edge of the forest during working hours by those whose occupation takes them to the woods. It does not tend, in the absence of *aegypti*, to involve other members of the household living under the same roof with infective cases. The disease in man is apparently an accidental one occurring in the course of some cycle of infection in the jungle of which man is not an essential part. The infection apparently spreads throughout jungle areas without relation to routes of human travel. The only reasonable hope of prevention lies in individual immunization by vaccination.

A year ago the Foundation announced the successful development in the laboratories of its International Health Division of an effective virus (known as 17 D) for vaccination against yellow fever. By the end of 1937, 40,000 persons, largely in Brazil, had been vaccinated, and subsequent tests showed that full or partial immunity had been acquired in over 90 per cent of the cases. During the week ending 10th December, 1938, the number of people vaccinated passed the million mark, the total for the year being 1,059,252. The wide use of virus 17 D among exposed populations during active outbreaks of jungle yellow fever in 1938 has resulted in a mass of field observation almost as conclusive as laboratory experiments. Local physicians and field workers report a sudden reduction in observed cases in infected districts shortly after mass vaccination and cite instances in which individuals who failed to be inoculated contracted the disease later in infected forests, while vaccinated members of the same groups escaped. Field experience suggests that the protective effect of vaccination begins not later than a week after inoculation, although laboratory tests fail to show demonstrable antibodies as early as this.

The duration of the immunity induced by virus 17 D can be determined only by future studies. Of twenty-one persons whose blood was tested one year after vaccination, nineteen were found to be still immune. Monkeys vaccinated two and a half years ago are still completely immune.

While vaccination promises to be of great aid in preventing the transfer of yellow fever by the human host from one locality to another, it cannot of course eliminate the virus in the jungle nor block its dissemination through contiguous forests in the tropics. Lurking somewhere in these forests are unknown vectors and other hosts than man; and a great deal of work remains to be done before they can be accurately identified.

No case of aegypti-transmitted yellow fever was observed in any locality in the Americas in 1938. This is the result of hard-won knowledge and eternal vigilance. As one looks back to the early beginnings of the fight against yellow fever under the leadership of pioneers like Walter Reed and Carter and Finlay and Gorgas, it is possible to see how great the advance has been. We know now that the solution of the mystery is much more complex than Reed and his associates imagined. But although yellow fever is still a serious public health problem, there are substantial grounds for believing that the battle is at least half won. Unless the disease should break out in some country like India, for example, where it has never before been found, the future would seem reasonably assured.

THE THREAT TO THE WESTERN HEMISPHERE

Anopheles gambiae, from Equatorial Africa, has invaded South America and is making itself very much at home in Brazil.

Until 1930 this species of mosquito was not known on this side of the Atlantic. In that year, however, or shortly before, it crossed the ocean, apparently by airplane or on one of the fast French destroyers which at that time were working in connection with the French air lines between Dakar in West Africa and Natal in Brazil. The species was first discovered in 1930 within the city limits of Natal by a member of the Foundation's staff, during a routine mosquito survey in connection with the yellow fever service. The seriousness of its presence was immediately recognized, but it was hoped that the invasion might be localized by natural conditions unfriendly to the invader.

These hopes were disappointed. In 1930 and 1931 there occurred in the vicinity of the breeding area in Natal an outbreak of malaria of a severity unprecedented in the annals of the city. The Yellow Fever Service was compelled to undertake gambiae control in order to maintain an efficient staff for its own work. By 1931, following prevailing winds, gambiae mosquitoes had travelled up the coast 115 miles. Two years of severe dry seasons seemed to check the invasion, and then, with the recurrence of normal rainfall, the onward flight started again.

In recent years severe epidemics of gambiae-carried malaria have occurred in localities over two hundred miles west and north of Natal.

In its public health work The Rockefeller Foundation maintains its own scientific staff. While it supports, through grants, the public health activities of other institutions, for the most part it pursues its own programme in the field, operating on a world-wide basis. This programme dates back to the creation of the Foundation in 1913—and even earlier, through the activities of the Rockefeller Sanitary Commission.

A recent writer has suggested that scientific research should not be left to the uncertainty of private philanthropy but should be made a responsibility of the government. Without attempting to argue the theory implied in this broad contention, it is interesting to analyse what is happening in the field of medical research. While exact statistics are wanting, it seems evident from those available that tax sources to-day in the United States are providing as much money for research in medicine as all other sources put together, excluding industry, but including private hospitals and universities, foundations, and individual donors.

TASKS AHEAD FOR MEDICINE

The reason that The Rockefeller Foundation, in the medical sciences, is concentrating its efforts on mental

hygiene is because it believes that at the moment that field represents one of the most underdeveloped areas in all medicine. Cases of mental and nervous diseases occupy more hospital beds in this country (U. S. A.) than all other diseases combined.

But with all the need that exists in this field it would be foolish to shut one's eyes to the fact not only that other fields are also backward but that science is on the threshold of great events in medicine; adequate support in a dozen different areas might well bring results of incalculable benefit to human health and welfare.

During 1938 the Foundation made a number of grants for the development of projects in the new field of 'molecular biology'.

The Foundation's largest commitment during 1938 in the field of the natural sciences was a conditional appropriation of \$1,500,000 to the University of Chicago toward the establishment of a \$2,000,000 endowment fund for research in the biological sciences. To provide for the support of biological research during the three years in which the University is raising its share of the permanent fund, the Foundation made an additional grant of \$180,000. The Division of Biological Sciences of the University of Chicago occupies a prominent position in American science. Its field is a wide one, the departments of biochemistry, physiology, anatomy, pharmacology, bacteriology, and psychology, as well as zoology and botany, co-operating to develop a balanced and integrated research programme.

Harvard University was given \$100,000 for expenditure over seven years toward the cost of research in the Department of physical chemistry in its Medical School. This study will provide quantitative data on the chemical and electrical behaviour of proteins and lipoids. A grant of \$75,000 was made to the University of Illinois in support, over five years, of studies in nutrition, with particular reference to the function of the amino-acids. The University of Stockholm was given \$37,400 for its institute of experimental biology. A grant of \$40,000 was made to the Roscoe B. Jackson Memorial laboratory at Bar Harbour, Maine, toward the cost of a building to house the laboratory's unique stocks of specialized and standardized mice, which are supplied to research workers throughout the country.

THE RETREAT FROM REASON

To speak of research in the field of international relations in such an anxious and disillusioned hour as this may seem almost like a jest. Everywhere reason is on the defensive and we live in danger that mass hysteria will completely overwhelm it at a time when it is most needed as a safeguard. If there have always been wars and rumours of wars, never before has there existed the possibility of such material havoc and cultural disintegration. It may be, as a recent writer has said, that this arid period in which we are living is the watershed between two forms of civilization, and that the future beckons to a Promised Land more pleasing than we dream. This optimism is creditable, but for the moment at least the world is facing a cultural crisis in which reason is everywhere in retreat.

Never has there been a greater need of intelligent understanding of the social forces that are moulding the future. Such an understanding must be based on realities, and not on intuition or wishful thinking. If the problems arising out of human relations are to be solved at all, it will be through the same scientific approach to facts, made in the same dispassionate spirit of inquiry, which has given man command over his physical environment. That this course presents infinite difficulties no one will deny, but along this road lies the only ultimate hope.

Acting upon this faith, which to some may seem to burn with a feeble flame, many devoted organizations throughout the world are working directly on the problem of international relations, and The Rockefeller Foundation has been glad to continue its support in this field.

[These few extracts from that portion of the President's review which deals with medical matters

are all that we can find space for. They will we hope indicate to some extent the scope of this remarkable foundation in the branches of its work that is of chief interest to medical men.—Editor, I. M. G.]

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1937. VOL. I

With a deeper realization of the importance of public health problems, there has begun to arise a new determination to combat ill health and suffering by organized effort, and this national awakening to realities is one of the most hopeful developments any public health officer could desire to witness.

'The public health movement in India has now gained a considerable momentum and may be expected to effect in increasing measure its true purpose, that of improving the physical well-being of the people of India and of enlarging their capacity for enjoyment of life'.

The primary requirement for improving the public health is the provision of trained health staffs in urban and rural areas. The transference of public health to Provincial Governments after the Government of India Act of 1919 was followed by a steady progress in this direction, the desire for improvement is to be found everywhere, and it may be confidently anticipated that health staffs will gradually be provided all over the country.

Decentralization of public health administration has necessitated the creation of an organization whose object should be to co-ordinate provincial activities and to promote a greater and more uniform advance of public health in India. For these purposes the Central Advisory Board of Health has been inaugurated. While no statutory functions have been assigned to the board, the discussions which have taken place at its two meetings have shown that its proceedings command a wide interest.

A special committee appointed by the board has issued a comprehensive report on 'Maternity and Child Welfare Work in India'. Other committees have been entrusted with the task of investigating other important problems such as 'leprosy control', 'food adulteration' and 'inoculation of pilgrims attending festival centres'.

In addition, the board has recommended to the provinces the desirability of investigating, by means of local joint committees, common public health problems affecting civil, railway and military populations, while discussions on other matters of inter-provincial concern, such as controlling cholera epidemics, have also taken place. Thus it may be seen that the scope for the activities of the board in co-ordinating public health work all over the country is immense, and it may be expected that its usefulness will grow with the lapse of years.

The importance of rural health has been increasingly recognized in India within recent years. The transference of wide powers to the provinces and the extension of the franchise in order to make provincial Governments more responsible to the people, have produced a common desire to attack the problems of social ill health on a wide front, in which economic uplift, improvement of health, reform of the system of education and other ameliorative measures all find a place. Fresh efforts have been made to extend rural medical relief, provide safe village water supplies, better sanitation, maternity and child welfare work, and to wage special campaigns against diseases such as malaria, tuberculosis and leprosy.

In the field of rural hygiene, the application in this country of costly sanitary methods is outside the bounds of practical politics, because of the immensity of the population and areas to be covered. Organizations known as 'health units' have been established in four or five provinces with financial assistance from the Rockefeller Foundation, and in these areas considerable progress has already been achieved.

It is hoped that these activities in limited areas will be the precursors of more widespread health work in different parts of the country.

It is not generally recognized that, in medical research, particularly in tropical diseases, a long record of successful achievement stands to India's credit.

The research institutes maintained by the Governments in India, the members of the Medical Research Department of the Government of India and the Indian Research Fund Association have been responsible for the high place India has secured for herself in the field of medical research.

The three important international organizations with which India is closely connected in the sphere of public health and port quarantine are the International Public Health Office, Paris, the Health Organization of the League of Nations, Geneva, and the League's Eastern Bureau at Singapore.

India is still regarded with suspicion as a reservoir of infection for such diseases as smallpox and cholera, and it is of great importance to her overseas trade that this suspicion should be dispelled as soon as possible. Considerable advance in port health organization and in control of infectious disease has been made within the past few years.

Another direction in which marked progress has been made is in the field of nutrition. The Indian Research Fund Association recognized the importance of sound nutrition of the people many years before the subject was taken up by the League of Nations and by the Governments co-operating with that international body. The contributions made by Sir Robert McCarrison to this science are now seen to be much more generally applicable than was originally realized.

In more recent years, the practical aspects of the nutrition problem have received greater attention. By laboratory studies of the common foodstuffs and the actual diets consumed by the people, and by field studies for ascertaining the nutritional state of the people, much information has been collected which is invaluable for the betterment of national nutrition. Further, researches have demonstrated the advantages of adding milk, even skimmed milk, to the ordinary unsatisfactory diet of many people, while the common deficiency of vitamin A in the diet can be corrected by taking red-palm oil which can be produced in India. From the practical point of view the importance of these researches is immense, because the nutritional state of the people can be improved only by methods which are cheap.

To better the nutritional state of the people it is essential to correlate nutritional researches with the activities of animal husbandry and agricultural departments. For this purpose a liaison officer trained in human nutritional work has been appointed and it is his duty to keep in touch with all provincial agricultural and animal husbandry departments. Further, a National Nutrition Committee has been appointed which includes nutrition workers, representatives of agricultural and husbandry departments, and expert educational and economic advisers.

The population problem

Special committees in provinces to study the population problem and educate the public are recommended.

While the birth rate has shown little change since 1891, the death rate has been falling since 1921. The average annual increase during 1921-30 was just under two millions. During the succeeding seven years, which were free from violent outbreaks of epidemic disease, the average yearly increase of population in British India is estimated at just short of three millions. These facts support the inference that the present decade is likely to present an even larger rate of increase than that recorded during 1921-31. During the period, 1921-31, the increase of population in India was approximately 34 millions while the indications are that during 1931-41, the increase will in all probability be 45 to 50 millions.

The continuing low standard of living and the rapid expansion of numbers that have characterized the

present and preceding decennia are facts which must be faced. Into this complex situation another important factor has been introduced in the form of a preventive health campaign which, in spite of serious deficiencies, has already saved increasing numbers of human lives. No civilized government can turn back on an expanding programme of public health endeavour, so that it is all the more essential for thoughtful men and women to turn their attention to the study of the population problem.

In the words of Sir John Megaw, 'What is required, is education of the whole community in life planning. The people must be made to realize what they are up against, and how they can control the forces of nature to their own advantage. The best brains of India helped by the best brains of the outside world will be needed. Experts in agriculture, education, public health, economics and industry must co-operate in deciding what should be taught; then the subject-matter must be prepared in a form which will be palatable to the masses'.

Maternal deaths

At least 200,000 women die every year in India from causes arising from child-bearing. In 1937, deaths of infants under one year of age accounted for 24.8 per cent of the total mortality at all ages, of children under five for 18.6 per cent, and of those between five and ten years of age for 5.4 per cent. Corresponding figures for England and Wales in 1936 were 7.1 per cent, 2.5 per cent and 1.2 per cent.

Maternal mortality enquiries conducted in limited areas suggest that, for India as a whole, about 20 women die among 1,000 undergoing pregnancy and childbirth.

Accumulating evidence seems to indicate that child-bearing takes a much higher toll of life in urban than in rural areas and that the good effects of the better urban facilities may be more than outweighed by the ill-effects of overcrowding, of lack of sunshine and fresh air and of ill-balanced diets. Few reliable figures for maternal mortality are available for rural populations, but the maternal mortality rate recorded in three 'health-unit' areas in South India was only 5.0 per 1,000 total births.

The increasing concern at this enormous loss of life and the heightened sense of responsibility for the health and safety of mothers and children were reflected in the decision of the Central Advisory Board of Health in 1937 to appoint a special committee to report on the whole subject of maternity and child-welfare work in India. The committee completed its work recently and its comprehensive report has now been approved by the board and has been issued.

The report stressed the importance of appointing a properly qualified and experienced woman medical officer in each province for the efficient administration of maternity and child-welfare work.

The employment of women doctors in the management and supervision of municipal and other local maternity and child-welfare schemes is also urged. For the benefit of the mothers and children requiring advice and assistance, a woman doctor's services are essential, because there are limitations to the employment of non-medical women in the welfare centres.

Another recommendation refers to the desirability of providing a system of grants-in-aid from Government sources, not only because these stimulate local bodies to improve their services but because they give official public health departments a suitable measure of control and supervision over the work undertaken by local authorities.

Further advance has been made by the recent passing of a number of provincial Nurses', Midwives', and Health Visitors' Registration Acts, designed to secure the registration and better training of midwives and health visitors.

A sound training in pre-natal and post-natal care is essential both for medical students and midwives. For this purpose, well-organized pre-natal and post-natal clinics should be provided in all hospitals training students and midwives, and attendance at these

clinics should be included in the courses of instruction in midwifery for medical students.

The organization of maternity and child-welfare work in India has, in the past, been largely due to voluntary effort. The stage seems to have been reached when transition from voluntary direction to official control must take place if further developments are to be made, and the problem during the next few years will be to preserve a proper balance between government and voluntary effort.

Causes of death

'Fevers' alone accounted for over 3,000,000 deaths or 55 per cent of the total mortality, and respiratory diseases for 8 per cent in 1937. The large figure for 'fevers' almost certainly includes over a million due to malaria and large unknown numbers due to typhoid fever and tuberculosis.

Existing agencies for the registration of vital statistics in rural areas make it impracticable to carry out classification of the causes of death except in a few large groups and, apart from such diseases as cholera, smallpox and plague with which the people are familiar, other deaths are ordinarily recorded as 'fevers', 'respiratory diseases' and 'other causes'. So true is this that nearly 93 per cent of the six million and odd deaths registered during 1937 were placed in these three groups.

In comparison with these diseases deaths from cholera, smallpox and plague are of relatively minor importance, though in the popular imagination these three are the most dreaded epidemic diseases. In fact, during the period 1925-37, the combined mortality from these three diseases did not exceed, in any year, 10 per cent of the total recorded mortality.

Malaria, tuberculosis and leprosy have, within recent years, received increasing attention from health authorities and voluntary organizations in the country. Provincial public health reports show a general recognition that malaria constitutes the major health problem in most provinces. The rural malaria death rate is approximately three times the urban rate and, as nearly 90 per cent of the population is rural, the problem is urgent.

The general policy in the provinces is to provide an adequate supply of quinine or cinchona febrifuge, to popularize the use of these drugs as far as possible by means of propaganda and teaching in the schools, and to provide extra medical staff and travelling dispensaries to localities visited by regional epidemics.

Regarding tuberculosis, the last decade has recorded considerable progress in organized effort. In 1929 a central organization came into being when various schemes were considered for the utilization of the King George V Thanksgiving Fund. It was decided that this fund should be devoted to a campaign against tuberculosis and the King George Thanksgiving Fund Anti-Tuberculosis Committee was constituted. With an annual income of only Rs. 53,000 the activities of the committee were necessarily restricted.

The special appeal for funds for fighting tuberculosis which was issued in the name of the King-Emperor by Her Excellency the Marchioness of Linlithgow in December 1937, has met with an excellent response and has made it possible to organize the anti-tuberculosis campaign on a wider basis. The Tuberculosis Association of India was formed a few months ago, incorporating the King-Emperor's Anti-Tuberculosis Fund and King George Thanksgiving Anti-Tuberculosis Fund.

The inauguration of the Indian Council of the British Empire Leprosy Relief Association in 1925 was a distinct advance in the campaign against leprosy. A capital fund of Rs. 20,25,000 was created by an appeal to the country and the annual income from this fund, amounting to nearly a lakh and a quarter, was made available for furthering anti-leprosy work in all directions. Later, a further donation of Rs. 3,13,000 was received from Their Majesties' Silver Jubilee Fund. The demonstration that early cases of leprosy were amenable to treatment also helped towards awakening public interest and towards the organization of effort to combat the disease.

Research work has been carried on at the School of Tropical Medicine, Calcutta, in co-operation with the authorities of the School and the Indian Research Fund Association. This work has been carried out at a cost of Rs. 3,37,000 up to the end of 1938, and the results obtained have been published in the annual reports of the Association as well as in scientific journals in India and abroad.

Food adulteration

Adulteration of common articles of food is widely practised in India and the subject has not received the attention it deserves. Milk and milk products are everywhere adulterated. In one province, 73 per cent of the samples of *ghee* examined, 50 per cent of the samples of milk and 40 per cent of the samples of butter, were found to be adulterated. One of the causes of this unsatisfactory state of affairs is the apathy with which the public view the matter.

Health in schools

The importance of a well organized school medical service in a national health programme requires no special emphasis. 'Medical Science has proved with unmistakable clearness that disease and incapacity in adolescence and adult life find their source, all too often, in the seed time of childhood. It cannot be doubted that much of the excess of sickness and mortality under forty years of age must be attributed to this origin and some of the maternal mortality, some of the recruits rejected on physical grounds, some of the lost time in industry, some of the lack of resistance to infective disease may all derive from this same source'. These words of the Chief Medical Officer to the Board of Education, England, and Wales, are equally applicable to India.

Fairs and festivals

Within recent years the sanitary control of pilgrim centres has received increasing attention from provincial health authorities. The measures taken for this purpose have, in fact, reduced to a great extent the danger of explosive outbursts of cholera, although it must be remembered that, as in the extensive epidemic that followed the Hardwar Kumbh Mela in April 1938, large festivals with their inter-provincial traffic in pilgrims, who have often to pass through endemic regions of cholera, always hold out a threat of outbreaks. However, the general effect of precautionary measures now being taken has been satisfactory, for during 1937, all fairs and pilgrimages in the provinces of British India passed off without any serious outbreak of infectious disease in epidemic form.

The problem of health education in India is complicated by the fact that the majority of the population is illiterate. Moreover, there exist certain age-long customs and habits which cannot be easily changed. Instances are the indiscriminate pollution of village sites with nightsoil and the indifference of the people to contamination of their water supplies. It is difficult to convince the villager that, in respect of many diseases, man is his own worst enemy and that a radical change of habits is essential if sickness and mortality arising from avoidable diseases are to be prevented.

ABSTRACT FROM THE ANNUAL REPORT OF THE INDIAN RESEARCH FUND ASSOCIATION, 1938

THE cause of epidemic dropsy has for long been the subject of intensive research in the School of Tropical Medicine, and the All-India Institute of Hygiene and Public Health, Calcutta. Recent work at both institutions has tended to emphasize the association of mustard oil with the propagation of the disease, a theory which is not new but which had been replaced for a time by two others, namely, those of contact infection from patient to patient and of infection carried through rice damaged by unfavourable conditions of storage.

The studies suggest that the offending factor is the seed of a plant, *Argemone mexicana*, which appears to be widely distributed and to be often present as a weed in mustard plant fields. Its seeds are harvested with mustard seeds and argemone oil is also expressed with mustard oil without the manufacturers being aware of such adulteration.

In some areas, such as the Punjab and the North-West Province, cholera appears only at intervals of years, in certain parts of Bengal it starts almost regularly at the same season every year. An investigation into the causes is complicated by the fact that, apart from the true organism responsible for the disease, numerous other allied organisms exist in water supplies. A differentiation of the characteristics of the true cholera vibrio from its allies and the formulation of methods of its control are therefore essential.

Considerable success has of late been achieved in these two directions in India, and the researches carried out have received warm appreciation from the International Public Health Office at Paris. In the light of the new knowledge, a field investigation is now being undertaken in Bengal, and it is hoped that the results of this enquiry will enable preventive measures to be taken with greater success.

Malaria investigations, both in the laboratory and the field, have proceeded under the Malaria Institute of India, which is financed by the Indian Research Fund Association. In the Wynaad, Madras, and in the Terai in the United Provinces, research units have been making field studies, and similar investigations are proposed for Orissa along the margin of the Chilka Lake. In Delhi, also, anti-malarial operations were supervised by the Malaria Institute. In addition, expert advice is given to the Provincial Public Health Departments in respect of anti-malarial schemes.

In the Haffkine Institute, Bombay, investigations were continued as to the best conditions under which anti-plague vaccine of high protective value could be manufactured. An anti-plague serum has also been produced for the treatment of patients. The serum has had a limited trial during an outbreak of plague in Bihar, and the results so far recorded suggest that its use reduces mortality.

Cyanogas fumigation for keeping down the rat population has been tried as an anti-plague measure in the Cumbum Valley, Madras, and the conclusion reached that fumigation every quarter consistently for a few years may reasonably be expected to eradicate the disease.

A statistical survey of leprosy has been carried out in a group of 42 villages. While the gross incidence of the disease was found to be 4.4 per cent in the total population, only 18 per cent among the patients were of the severe lepromatous type. Nearly 80 per cent of the cases gave a history of contact with leprosy patients, the infection being communicated in a third of cases by near relatives, in another third by distant relations, and in the remaining third either by unrelated or by unknown persons. The severe lepromatous form of the disease transmitted infection more quickly than the relatively milder nerve type.

A study has also been made of the influence of skimmed milk as a supplement to the diet of leprosy patients, and it has been found that its administration seems to hasten the recovery of the lepromatous type.

Tuberculosis investigations covered a wide range and included a detailed survey in a jute mill 23 miles from Calcutta employing 5,000 labourers, a study of children in tuberculous homes and an enquiry into the incidence of the infection among medical students and nurses in Lahore. There is a general recognition that the disease is spreading among urban and rural populations owing to industrialization and rapidly increasing transport facilities and the need is felt of defining the extent of infection in different areas and of determining the social, economic, industrial and other factors responsible for its incidence.

The survey of tuberculous homes revealed that tuberculosis was an important cause of morbidity and

mortality among infants and children, a fact not noticeable from public health returns.

The enquiry at Lahore showed that of 434 medical students examined, 53 per cent had had tuberculosis infection at some time or other and that amongst fourth- and fifth-year students, the percentages were as high as 70 and 80 respectively. This does not of course mean that they were active cases of tuberculosis. In the large majority the infection had been overcome by the natural resistance of the body. In fact, only 4.5 per cent showed physical signs of having suffered from active tuberculosis.

In the field of nutrition, simultaneously with basic research, the programme has been made more practical by relating laboratory investigations to the immediate necessity for improving the nutritional standard of the people under present economic conditions. As instances may be mentioned the discovery of a cheap substitute in red palm oil for cod-liver oil to make up the deficiency of vitamin A in the diet, a factor so widely deficient in India, and the demonstration that the use of calcium lactate at a cost of half to one anna per month per child improves its health. Special attention has been paid to diets largely composed of tapioca and it has been shown that the most important defect in such diets is the deficiency of protein.

A study is being made of the effect of the use of highly milled rice on nutrition. It is recognized that as the use of home-pounded rice is rapidly disappearing, a solution of the problem of ensuring consumption of rice in its most nutritive form must be sought along other lines.

Comparison of rice and maize has shown that rice is richer than maize in nicotinic acid, which prevents pellagra. This may explain why rice eaters rarely develop the disease.

Medical men from the provinces and states have been trained to carry the campaign for better nutrition into different parts of India and to educate the people in matters of nutrition.

REPORT OF THE HAFKINE INSTITUTE, BOMBAY, FOR THE YEAR 1938

In general the activities of the Institute remained the same as in previous years. The production of large quantities of prophylactic vaccine, mainly Hafkine plague vaccine, cholera vaccine, typhoid vaccine and antirabic vaccine, and the diagnostic work for the hospitals largely monopolized its limited resources in funds and personnel. An idea of the work involved in the production of vaccines alone can be gained from the fact that 3,411,258 c.c. (i.e., 1,137,086 doses of plague vaccine, 608,506 c.c. of cholera vaccine, 38,269 c.c. of typhoid vaccine and 733,530 c.c. of 5 per cent antirabic vaccine) were issued during the year. Despite the pressure of routine duties most members of the staff were enabled by the generous aid of the Indian Research Fund Association in funds and personnel to carry out valuable researches. For plague and pharmacological researches the Association contributed about Rs. 50,000. Two voluntary workers and a Lady Tata Memorial Scholar also contributed to the research activities of the Institute.

During the year Government sanctioned a valuable addition to the staff. Advantage was taken of the retirement of Rao Bahadur Chitre to engage an entomologist in his place. The services of a noted Indian entomologist, Dr. M. Sharif, who is an authority on fleas, were secured and a department of entomology organized. Since insects play an important role in the spread of disease in the tropics this new department should prove of great value to the health organization of the province, if the staff could be strengthened to enable the Institute to undertake field investigations. The time of the present staff is fully occupied by laboratory bench work and it does not permit the Institute, the only medical research organization of the Province, to play that rôle in health organization which it should by conducting field and other studies on the urgent

health problems of the people, in close association with the Public Health Department. In the 1924 report the then director strongly stressed the value of such an association and advocated the organization of a mobile unit. The need of such a unit is greater than ever, and it is hoped the staff of the Institute will be strengthened to permit of such work being undertaken. How valuable such an association can be was demonstrated by the enquiry undertaken during the year by the Institute into the outbreak of typhoid fever in the city, in association with Municipal Health authorities.

Antiplague serum.—A small outbreak of plague at Bettiah, Bihar, permitted a field trial of the antiplague serum prepared at the Institute to be carried out. A temporary hospital was erected at the place and other facilities provided by the Bettiah Raj and the Bihar Government for which our grateful thanks are due.

The trial lasted from the middle of January to the end of April 1938. One hundred and twenty-four cases of plague were dealt with. Every alternate admission was treated with serum; others were treated with intravenous injections of iodine solution. No selection was made, but during the third week of the trial all patients admitted were treated with serum. Thus 69 patients were treated with serum, and of these 19 died of plague, giving a percentage mortality of 27 per cent. Of the 55 cases treated with iodine injections, 36 died, giving a percentage mortality of 65 per cent. If to these figures we add the figures of a previous trial conducted at Hyderabad with the same serum, we get 94 patients treated with serum, with 24 deaths, and percentage mortality of 25.5. From among 80 controls, there were 50 deaths giving a percentage mortality of 62.5. Clinically the administration of the serum produced very striking results; the general condition of the patients improved very rapidly with the disappearance of toxic symptoms. These results show that we have obtained a serum of a high curative value. The preparation of this serum was made possible by the exact biological methods worked out in this Institute. Animal experiments were designed which closely reproduced the conditions which severe cases of plague present, and serum was tested on such animals. These experiments yielded a clear idea as to the conditions under which the best serum could be obtained. The full significance of these results can be realized only when they are compared with the results obtained with other antiplague sera tried since the beginning of the present pandemic. None of these sera reduced the case mortality below 60 per cent.

Chemotherapy of plague.—Some of the sulphanilamide compounds which have proved to be so valuable in the treatment of streptococcal infection were tested for their curative value in plague infection. For this purpose animal experimental conditions were designed to produce disease approximating to the actual severe cases of plague. The compounds tested, Prontosil and M. and B. 693, showed little or no curative power. Further work is proceeding.

Plague vaccine.—No changes were introduced in the preparation of the plague vaccine during the year. Though the recent researches conducted at the Institute have thrown a flood of light on the problem of the preparation of a plague vaccine, there are still some obscure points to be solved. Exact determinations are being made to compare the protective powers of agar and broth vaccines to see which of the two methods gives the best chance of producing vaccines of uniformly high protective power. Experiments are also being conducted to increase the growth of organism in broth cultures, as the protective power of a broth vaccine incubated at a suitable temperature depends on the number of the organisms growing in the medium.

Serology of plague.—A great deal of work has been conducted to elucidate the phenomena of agglutinin and precipitin reaction and their relation to active immunity in plague, but the results are still very divergent and more work will have to be carried out before any worthwhile conclusion can be drawn.

Enquiry into the outbreak of typhoid fever in the City of Bombay

During the year there was a sudden increase in the incidence of typhoid fever in the city and the Institute was asked to investigate the sources and mode of this outbreak in collaboration with the Municipal Health authorities. The Institute assumed responsibility for (1) laboratory diagnosis of cases by sending out an officer to take samples of blood and other material on receipt of a call from any medical practitioner or hospital and (2) investigation into the source or sources of infection and the mode of spread of the disease.

Cases.—From the 25th of June to the end of the year, the Institute examined 398 cases, out of which 234 proved to be cases of typhoid fever and 16 cases of paratyphoid A. The fact which requires to be stressed here is that this laboratory aid in the diagnosis of cases, given absolutely free of charge to medical practitioners, improved considerably the situation regarding the notification of this disease in the city. For the five-year period previous to the present enquiry 1,959 attacks and 1,349 deaths had been notified from typhoid. These figures give a very improbable case mortality of 69 per cent while the present enquiry yields among the definitely diagnosed cases, the very likely figure of 9.3 per cent case mortality, showing that in previous years roughly 1 attack out of every 6 occurring in the city was notified. It was obvious that the medical practitioners appreciated the help given to them; they were willing to make use of it, leading to a much higher percentage of notification. It is very gratifying to note that Government is devising a permanent scheme to make available to medical practitioners such laboratory aid in the diagnosis of their cases, free of charge.

Sources and mode of spread.—Though the water supply of the city was not found to be up to the required standard of purity, it was not held responsible for the typhoid outbreak. Largest number of cases occurred in unsewered parts of the city where basket privies were in use. Some sewage from the areas was allowed to flow into the open drains. This, coupled with a great increase in the number of flies in the area, explained part of the trouble. Direct contact due to overcrowding in tenement houses and the refusal of patients to go to the infectious diseases hospital was another factor in the spread of the disease. No articles of food examined were incriminated, but the carrier problem could not be tackled for lack of co-operation on the part of the public.

Studies on the synthetic anti-malarial drugs, plasmoquine and atabrin, were continued. The observation reported last year that the placenta filtered out plasmoquine and prevented large quantities of the drug from entering the foetal circulation, was further confirmed by the actual measurement of the concentration of plasmoquine in the maternal and foetal blood simultaneously after giving large doses of the drug to the mother. It was further shown that therapeutic doses of plasmoquine given to pregnant experimental animals did not in any way affect the litters given by the animals. These studies show that this drug can be safely used during pregnancy.

The fate of plasmoquine and atabrin in the body has been studied. Plasmoquine is largely destroyed by the liver and atabrin was retained by reticulo-endothelial cells. A very important observation regarding the formation of acetylcholine was made. It was found that chiefly nerve cells were responsible for its formation.

Some studies had shown that the average hæmoglobin content of blood of Indian normal subjects tallied exactly with similar averages worked out in America for white American subjects. These averages were 15.37 g. and 12.99 g. per 100 c.c. of blood for men and women respectively. This observation suggested the possible existence of a hæmoglobin constant. Nineteen subjects have so far been examined and an attempt is being made to find if there is a definite ratio between hæmoglobin content and some such unit as body surface.

The power of the kidney to eliminate urea from the blood stream is employed as a measure of renal function for clinical purpose. Moller, MacIntosh and Van Slyke's blood urea clearance test worked out on American subjects is usually employed for the purpose. It was noticed in the course of clinical work that in the case of normal Indian subjects while the blood urea content is within the same limits as that of American subjects the urea content of urine of normal Indian subjects is about half of American subjects. This raises an interesting issue whether the formula on which the urea clearance test is based applies to Indian subjects. This subject is being studied.

Four more antirabic treatment centres were opened during the year, making a total of 87 in the Province and in the neighbouring areas. The opening of these centres is a real boon to the public. These centres enable the public to get the antirabic treatment without having to make unnecessarily long journeys.

Demand for the antirabic treatments showed a further rise during the year. 11,479 treatments were issued as compared with 9,715 treatments issued last year.

THE REPORT ON THE PUBLIC HEALTH ADMINISTRATION OF THE PUNJAB FOR THE YEAR 1937

THE population of the province continues to increase, the estimated mid-year population for 1937 being 26,000,000 as against 25,500,000 in 1936. As the director states, this annual increase raises questions with respect to standards of living and the economic development of the province which deserve consideration.

Fevers.—The number of deaths in the province during the year from all causes was 556,000, of which 376,000 were recorded as deaths from fever as compared with 374,000 in 1936. The term 'fever' includes a considerable group of diseases of which the predominant symptom is fever, e.g., malaria, enteric, tuberculosis and influenza, and as the director explains, reports as to the diseases which may have caused death in particular cases cannot be regarded as accurate. Inaccuracies are in fact to a large extent inevitable in the rural area where there are at present few doctors to diagnose the exact nature of a disease.

Smallpox.—The province is never entirely free from smallpox. The disease does not as a rule assume serious epidemic form but it shows a tendency to increase every few years; there was, for example, a severe epidemic in 1932, and a further epidemic, though of lesser intensity, has to be recorded in 1937. In 1936 there were 6,000 cases with 2,500 deaths, and at the same time three and a half million vaccinations and revaccinations were carried out. In 1937 there were 10,000 cases with 4,000 deaths, and five and a half million vaccinations and revaccinations were carried out. During the two years therefore the number of persons vaccinated was eight millions, which is nearly a third of the total population of the province but the disease showed a further increase in 1938 though exact figures for that year are not yet available. As regards the 10,000 cases which occurred in 1937, the number of villages infected was 1,350 as compared with 1,000 in 1936. Of the 4,000 deaths in 1937, 1,500 were of infants below one year of age, and 1,800 of children between the ages of 1 and 10. The figures indicate that still greater effort is needed to ensure the vaccination of infants as soon as possible after birth. Under the present act local bodies are only empowered to make primary vaccination compulsory; the director has, however, submitted proposals for an amendment of the law so as to enable any local body which may wish to do so to make revaccination compulsory, and these are being examined.

Cholera.—Cholera is a disease of which a number of cases occur every year, and when streams or wells are infected it sometimes spreads with great rapidity. In 1936 there were 2,700 cases with 1,700 deaths. It is, however, satisfactory to note that during 1937 there were only 184 cases with 105 deaths. As usual the infection was in an appreciable number of cases

imported from outside the province, particularly from Hardwar.

Plague.—Plague is a disease from which the province has suffered much in the past. Wherever the disease has appeared mass inoculation has been undertaken; at the same time the public health department have for many years conducted a campaign against rats in areas in which the disease has constantly appeared. In 1936, only 153 deaths from plague were recorded, and in 1937 (for the first time after 40 years) no cases at all occurred in the province though 4 were imported from outside. The director states that the factors which have caused this cannot be determined.

Tuberculosis.—Very little is known about the incidence of tuberculosis except that it is believed to be considerable. The people as a rule are not inclined to take notice of the disease in the early stages when it may be curable, and death when it occurs may be recorded as from fever or one of the respiratory diseases. It is noted that during 1937, 5,000 deaths in the province were returned as on account of tuberculosis compared with 4,800 in 1936, but the true figure is probably higher. While what it has seemed possible to do to deal with the tuberculosis question has been done in the past, no concerted attack has been instituted against the disease, partly on account of the magnitude of the question and the difficulty of knowing where to make a beginning. A concerted attack is however now about to be launched on an all-India basis under the auspices of Her Excellency the Marchioness of Linlithgow's Tuberculosis Association of India with its affiliated provincial branches.

Leprosy.—A leprosy survey has been proceeding for some years, and has now been completed in 18 out of the 29 districts. Two thousand cases have so far been observed, and the number of special clinics, which serve as both treatment and propaganda centres, is now 106. The five leper homes continued their excellent work, ministering to 646 inmates of whom however only a hundred are Punjabis. Two hundred and sixty-four doctors in the province have now received special training in the diagnosis and treatment of leprosy.

Hookworm.—A hookworm survey has also been in progress for some years, and has now been completed in 20 districts. In some as many as 30 per cent of the persons examined were found to be infected, and treatment is now being administered partly at the local hospital or dispensary and partly by special treatment units. The disease would almost entirely disappear if latrines conforming to hygienic principles were to be generally adopted, or alternatively if all persons wore shoes.

Sanitation.—The standard of sanitation in towns remains low. In the larger municipalities which employ a whole-time health officer, arrangements are on the whole as satisfactory as can be expected, regard being had to the insanitary habits of many of the people. In the smaller towns, however, which have not the funds either for a health officer or for roadside drainage, conditions are usually deplorable, and, as the director states, the 3,000 cases of enteric with a thousand deaths reported from urban areas are almost certainly an underestimate.

Before public health conditions in a village can be regarded as satisfactory, the minimum that is necessary is that the water supply should be safe from pollution, that the inhabited area should be properly drained, and that there should be a system for the regular removal of refuse to a distance; out of the 35,000 villages in the province only 1,960 attain this standard at present but improvement may be expected as education spreads. Six thousand new hand-pumps are reported to have been installed in villages during the year while 450,000 feet of masonry drains were laid down compared with 260,000 feet in 1936. It is also reported that 600 village sanitary committees were formed during the year, and though the director notes that few seem to have functioned it is encouraging to see that villagers themselves in different districts subscribed over a lac of rupees during the year for sanitary works and in addition contributed labour and material.

Maternity and child welfare.—It is probable that there is now no urban area in which there is not a sufficiency of trained *dais*, and municipal and small town committees are being encouraged to frame by-laws prohibiting practice by untrained women. In the rural area, however, there is still a shortage of trained *dais*. The women are trained at health centres of which during the year under report there were 89 with 128 sub-centres, the centres being under the charge of lady health visitors who are trained in the Punjab Health School at Lahore at the rate of about 14 a year. The demand for lady health visitors exceeds the supply with the result that it has not been possible to open further centres for which funds existed. About 2,000 trained *dais* are known to be practising in the province, while another 2,000 are at present under training.

Inspection of schools and school children.—The medical inspection of school children is still in the experimental stage, and here again the difficulty in arranging for defects noted, to be regularly treated, is for a number of reasons considerable. During 1937 the further experiment was started of supplying milk in certain schools to those children who being sickly or undernourished may be most in need of it.

THE THIRD ANNUAL REPORT OF THE INDIAN INSTITUTE FOR MEDICAL RESEARCH, CALCUTTA, FOR 1937-38

THE third Annual Report of the Indian Institute for Medical Research shows that this Institute is receiving a much greater measure of sympathy and recognition both at home and abroad.

Although our financial difficulties still persist, there is no lack of devotion and earnestness on the part of our workers who alone have made it possible for the Institute to carry on its work fruitfully and efficiently.

In the department of bacteriology, the programme of researches included the work on the immunity problems connected with cholera and typhoid, which was continued throughout the year under review. The relation of streptococcus isolated from the throat with that isolated from puerperal fever was investigated and the result showed that the number of hæmolytic streptococcus obtained from throat swab of the maternity cases suffering from puerperal fever was very small.

In the department of protozoology, further studies on the problem of protozoal cultivation and protozoal immunity are being made with special reference to malaria, amebiasis and leishmaniasis. The results so far achieved appear to be very encouraging.

The department of biochemistry and nutrition put on the forefront of its programme of work during the year the problem of a nutritional survey of Indian food-stuffs and dietaries.

What is most gratifying to note is that of late public interest has steadily awakened in researches into food-stuffs and dietaries undertaken at different laboratories in the country, including ours. The importance of nutrition as a paramount factor in the improvement of national health needs no emphasis and we feel that the institute's work in this direction has the support of the public of India.

A large number of common food-stuffs and dietaries of Bengal have been investigated from various aspects at the institute. It has been known for some time that the type of food commonly consumed by urban populations in Bengal is not calculated to afford adequate nutrition especially during childhood and adolescence and also during pregnancy and lactation. Our biological investigations have revealed that the ordinary diet taken by an average family in Calcutta or in an average students' hostel is partially deficient in vitamins A and B-complex. The work at the institute reveals that the average diet is not only deficient in these vitamins, but also lacks to a considerable degree the very important body-building minerals,

Enquiry into the outbreak of typhoid fever in the City of Bombay

During the year there was a sudden increase in the incidence of typhoid fever in the city and the Institute was asked to investigate the sources and mode of this outbreak in collaboration with the Municipal Health authorities. The Institute assumed responsibility for (1) laboratory diagnosis of cases by sending out an officer to take samples of blood and other material on receipt of a call from any medical practitioner or hospital and (2) investigation into the source or sources of infection and the mode of spread of the disease.

Cases.—From the 25th of June to the end of the year, the Institute examined 398 cases, out of which 234 proved to be cases of typhoid fever and 16 cases of paratyphoid A. The fact which requires to be stressed here is that this laboratory aid in the diagnosis of cases, given absolutely free of charge to medical practitioners, improved considerably the situation regarding the notification of this disease in the city. For the five-year period previous to the present enquiry 1,959 attacks and 1,349 deaths had been notified from typhoid. These figures give a very improbable case mortality of 69 per cent while the present enquiry yields among the definitely diagnosed cases, the very likely figure of 9.3 per cent case mortality, showing that in previous years roughly 1 attack out of every 6 occurring in the city was notified. It was obvious that the medical practitioners appreciated the help given to them; they were willing to make use of it, leading to a much higher percentage of notification. It is very gratifying to note that Government is devising a permanent scheme to make available to medical practitioners such laboratory aid in the diagnosis of their cases, free of charge.

Sources and mode of spread.—Though the water supply of the city was not found to be up to the required standard of purity, it was not held responsible for the typhoid outbreak. Largest number of cases occurred in unsewered parts of the city where basket privies were in use. Some sewage from the areas was allowed to flow into the open drains. This, coupled with a great increase in the number of flies in the area, explained part of the trouble. Direct contact due to overcrowding in tenement houses and the refusal of patients to go to the infectious diseases hospital was another factor in the spread of the disease. No articles of food examined were incriminated, but the carrier problem could not be tackled for lack of co-operation on the part of the public.

Studies on the synthetic anti-malarial drugs, plasmoquine and atabrin, were continued. The observation reported last year that the placenta filtered out plasmoquine and prevented large quantities of the drug from entering the foetal circulation, was further confirmed by the actual measurement of the concentration of plasmoquine in the maternal and foetal blood simultaneously after giving large doses of the drug to the mother. It was further shown that therapeutic doses of plasmoquine given to pregnant experimental animals did not in any way affect the litters given by the animals. These studies show that this drug can be safely used during pregnancy.

The fate of plasmoquine and atabrin in the body has been studied. Plasmoquine is largely destroyed by the liver and atabrin was retained by reticulo-endothelial cells. A very important observation regarding the formation of acetylcholine was made. It was found that chiefly nerve cells were responsible for its formation.

Some studies had shown that the average hæmoglobin content of blood of Indian normal subjects tallied exactly with similar averages worked out in America for white American subjects. These averages were 15.37 g. and 12.99 g. per 100 c.c. of blood for men and women respectively. This observation suggested the possible existence of a hæmoglobin constant. Nineteen subjects have so far been examined and an attempt is being made to find if there is a definite ratio between hæmoglobin content and some such unit as body surface.

The power of the kidney to eliminate urea from the blood stream is employed as a measure of renal function for clinical purpose. Moller, MacIntosh and Van Slyke's blood urea clearance test worked out on American subjects is usually employed for the purpose. It was noticed in the course of clinical work that in the case of normal Indian subjects while the blood urea content is within the same limits as that of American subjects the urea content of urine of normal Indian subjects is about half of American subjects. This raises an interesting issue whether the formula on which the urea clearance test is based applies to Indian subjects. This subject is being studied.

Four more antirabic treatment centres were opened during the year, making a total of 87 in the Province and in the neighbouring areas. The opening of these centres is a real boon to the public. These centres enable the public to get the antirabic treatment without having to make unnecessarily long journeys.

Demand for the antirabic treatments showed a further rise during the year. 11,479 treatments were issued as compared with 9,715 treatments issued last year.

THE REPORT ON THE PUBLIC HEALTH ADMINISTRATION OF THE PUNJAB FOR THE YEAR 1937

THE population of the province continues to increase, the estimated mid-year population for 1937 being 26,000,000 as against 25,500,000 in 1936. As the director states, this annual increase raises questions with respect to standards of living and the economic development of the province which deserve consideration.

Fever.—The number of deaths in the province during the year from all causes was 556,000, of which 376,000 were recorded as deaths from fever as compared with 374,000 in 1936. The term 'fever' includes a considerable group of diseases of which the predominant symptom is fever, e.g., malaria, enteric, tuberculous and influenza, and as the director explains, reports as to the diseases which may have caused death in particular cases cannot be regarded as accurate. Inaccuracies are in fact to a large extent inevitable in the rural area where there are at present few doctors to diagnose the exact nature of a disease.

Smallpox.—The province is never entirely free from smallpox. The disease does not as a rule assume serious epidemic form but it shows a tendency to increase every few years; there was, for example, a severe epidemic in 1932, and a further epidemic, though of lesser intensity, has to be recorded in 1937. In 1936 there were 6,000 cases with 2,500 deaths, and at the same time three and a half million vaccinations and revaccinations were carried out. In 1937 there were 10,000 cases with 4,000 deaths, and five and a half million vaccinations and revaccinations were carried out. During the two years therefore the number of persons vaccinated was eight millions, which is nearly a third of the total population of the province but the disease showed a further increase in 1938 though exact figures for that year are not yet available. As regards the 10,000 cases which occurred in 1937, the number of villages infected was 1,350 as compared with 1,000 in 1936. Of the 4,000 deaths in 1937, 1,500 were of infants below one year of age, and 1,800 of children between the ages of 1 and 10. The figures indicate that still greater effort is needed to ensure the vaccination of infants as soon as possible after birth. Under the present act local bodies are only empowered to make primary vaccination compulsory; the director has, however, submitted proposals for an amendment of the law so as to enable any local body which may wish to do so to make revaccination compulsory, and these are being examined.

Cholera.—Cholera is a disease of which a number of cases occur every year, and when streams or wells are infected it sometimes spreads with great rapidity. In 1936 there were 2,700 cases with 1,700 deaths. It is, however, satisfactory to note that during 1937 there were only 184 cases with 105 deaths. As usual the infection was in an appreciable number of cases

If that is the case what are we all arguing about? Where is the deception, criminal or venial? Unless of course the wrong prescription is written on the bottle, but it is a most unusual procedure to write any prescription on the bottle that is given at a government dispensary.

But is it sufficient to cure the fever? There are other statements in his letter which make one doubt this. His vivid pen-picture of the disgruntled tribesman 'looking forlornly at a small quantity of liquid at the bottom of a large bottle' contrasted with the happy one with a full bottle (which might well have been illustrated by a marginal drawing of the local editions of Mr. Can and Mr. Can't) suggest at least a four-fold dilution. The dosage prescribed in local 'pharmacopœias' is not usually a wasteful one, and, if the amount is reduced to one-fourth of this, it will certainly fail to cure the fever in a very large number of cases. We have not quite followed the argument in the fifth paragraph of this letter, but the 'totally inadequate dose of quinine' he mentions seems to apply to the dose which he has already described as being 'sufficient to cure the fever'.

However, on balance this letter seems to indicate that, as a matter of general practice, from the government dispensaries in Waziristan a mixture is issued, which, though it purports to be a cure for malaria, will in actual fact fail to cure a large number of those who take it, who rely on it for curing their malarial attack, and whose subsequent opinion of 'western' medicine is dependent on their personal experience.

The next point on which we are at variance with our correspondent is on the subject of malarial treatment. Is the tribesman really so ignorant in refusing to continue taking quinine 'long after the disappearance of fever'? There is at the present day a school of thought which recommends a minimal course of quinine, and the weight of world opinion on this subject is against anything longer than a seven-day course of any anti-malarial drug as a curative procedure.

Now to take the offensive—though criticism of the individual dispenser was never in our minds and though the word 'fraud' was never meant to be applied to his attempts to make the best of a bad state of affairs, we are certainly prepared to apply a much stronger word to a system which condones and even necessitates this degradation of scientific medicine.

We venture to make only one suggestion why does our correspondent use quinine when cinchona febrifuge (totanquina standard) costs half as much, and is, at the lowest estimate, 95 per cent as efficacious?—EDITH, I. M. G.J

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL B. Z. SHAH returned from leave and resumed charge of the duties of Civil Surgeon, Belgaum, with effect from the forenoon of 25th September, 1939.

Lieutenant-Colonel Jelal M. Shah, M.B.E., returned from leave and is placed on general duty at the J. J. Hospital, Bombay, with effect from the forenoon of 25th September, 1939.

Lieutenant-Colonel A. H. Harty returned from leave and resumed charge of the duties of Civil Surgeon and Superintendent, B. J. Medical School and Mental Hospital, Ahmedabad, with effect from the forenoon of 30th September, 1939.

On having been recalled from leave Lieutenant-Colonel P. A. Dargan resumed charge of the Office of Civil Surgeon, Amritsar, on the forenoon of the 4th October, 1939, relieving Major J. J. Beausang.

Lieutenant-Colonel N. S. Jatar, C.I.E., D.S.O., Inspector-General of Prisons, C. P. and Berar, has been appointed to officiate as Inspector-General of Civil Hospitals, C. P. and Berar, in addition to his own duties from 6th October, 1939.

Lieutenant-Colonel E. W. O'G. Kirwan, C.I.E., on return from leave *ex-India*, is reappointed to be Professor of Ophthalmology, Medical College, Calcutta, with effect from the 29th September, 1939.

Major J. J. Beausang was reposted as Civil Surgeon, Sargodha, with effect from the forenoon of the 9th October, 1939, relieving Captain D. W. Taylor.

Major F. H. A. L. Davidson, on general duty in the Medical College Hospital, Calcutta, is appointed to be Civil Surgeon, Burdwan, *vice* Dr. Keshab Chandra Sen Gupta.

Major E. G. Montgomery, on general duty in the Medical College Hospital, Calcutta, is appointed to be Civil Surgeon, Jalpaiguri, *vice* Major G. B. W. Fisher.

Previous notifications are hereby cancelled. Major G. B. W. Fisher made over charge of the Jalpaiguri Jail to Dr. Ajit Kumar Dutta on the forenoon of 30th September, 1939.

Major W. Aitchison, M.C., has on recall from leave, been posted as Civil Surgeon, Allahabad, *vice* Major R. A. Wesson.

Major R. A. Wesson has been transferred from Allahabad to Gorakhpur, *vice* Captain A. B. Guild.

Major F. H. Whyte is appointed to the post of Civil Surgeon, New Delhi, with effect from the forenoon of the 9th October, 1939.

Major K. H. A. Gross, M.C., an Officiating Agency Surgeon, on return from leave, is appointed as Agency Surgeon in Bundelkhand, with effect from the afternoon of the 30th September, 1939.

Captain C. B. Miller has been appointed as Resident Medical Officer at the J. J. Hospital, Bombay, with effect from the afternoon of 28th September, 1939.

Captain R. de Solderhoff returned from leave and received charge of the duties of Resident Medical Officer, St. George's Hospital, Bombay, with effect from the forenoon of 28th September, 1939, from Captain C. B. Miller, transferred.

Captain D. W. Taylor, on relief by Major J. J. Beausang, was placed on special duty at the Civil Hospital, Sargodha, with effect from the forenoon of the 9th October, 1939, as a member of the leave reserve.

Captain F. W. Allinson, on general duty in the Medical College Hospital, Calcutta, is appointed to be Civil Surgeon, Bakarganj, *vice* Rai Dr. B. B. Hazra Bahadur.

Captain A. B. Guild has been transferred from Gorakhpur to Saharanpur.

The Secretary of State for India has appointed to the Civil Branch of the Indian Medical Service the following Officers of the Indian Medical Service with effect from the dates mentioned against their names:—

Government of India

Major S. S. Bhatnagar. Dated 26th June, 1938 (afternoon).

Major Jaswant Singh. Dated 11th July, 1938 (afternoon).

Major M. K. Kelavkar, M.B.E. Dated 20th October, 1938 (afternoon).

Major W. F. Cooper. Dated 9th November, 1938 (afternoon).

Bombay

Captain L. Feinhols. Dated 5th August, 1938 (afternoon).

Bengal

Captain J. W. D. Goodall. Dated 18th September, 1938.

Major E. A. R. Ardeshir. Dated 26th November, 1938.

Punjab

Captain F. V. Stonham. Dated 27th September, 1938.

Bihar

Captain W. B. Stiver. Dated 28th August, 1938.
 Captain F. W. Whiteman. Dated 8th September, 1938.

Central Provinces

Captain M. Sendak. Dated 29th July, 1938.
 Captain F. C. Leach. Dated 6th December, 1938.

Orissa

Captain J. W. Bowden, M.B., B.Ch. (Dub.), D.T.M. & H. (Lond.), I.M.S. Dated 11th October, 1938.

The Secretary of State for India has sanctioned the reversion to military employment of the following Officers of the Indian Medical Service (Civil) with effect from the dates mentioned against their names:—

Government of India

Major W. F. Cooper. Dated 30th December, 1938 (afternoon).

Bihar

Captain W. B. Stiver. Dated 12th November, 1938 (afternoon).
 Captain F. W. Whiteman. Dated 5th December, 1938 (forenoon).

LEAVE

Major-General E. W. C. Bradfield, C.I.E., O.B.E., K.H.S., Director-General, Indian Medical Service, is granted leave on average pay for 1 month and 1 day and in continuation leave on half-average pay for 4 months and 6 days, with effect from the afternoon of the 29th September, 1939.

Lieutenant-Colonel S. Nag, late Civil Surgeon, 24-Parganas, is granted leave for 3 months on medical certificate from the 1st October, 1939.

PROMOTIONS

The undermentioned Officer is granted the local rank of Major-General, without effect on pay and pension, whilst officiating as Director-General, Indian Medical Service:—

Colonel G. G. Jolly, C.I.E., V.H.S.

Majors to be Lieutenant-Colonels

R. W. H. Miller. Dated 9th October, 1939.
 P. A. C. Davenport. Dated 22nd October, 1939.

Captains to be Majors

F. M. Khan. Dated 3rd October, 1939.
 D. Datt. Dated 10th October, 1939.

Captain to be Major (provl.)

M. G. Saincer. Dated 12th October, 1939.

RETIREMENTS

Colonel Sir A. J. H. Russell, C.B.E. Dated 30th August, 1939.

Brevet-Colonel F. A. Barker, O.B.E., C.I.E. Dated 16th October, 1939.

Note

EPHYNAL 'ROCHE'

A PURE SYNTHETIC VITAMIN E (ANTI-STERILITY VITAMIN)

EXISTENCE of a fertility vitamin (vitamin E) was first suggested by Evans in 1922. It was found to be present mainly in plant oils, especially in wheat-germ oil and was isolated and named by him as 'tocopherol'. Its constitution and active principle were elucidated by Karrer and his collaborators. The biological standardization and perfection of the synthesis on a technical scale followed in Roche Laboratories and synthetic vitamin E is now marketed as 'd.l.a.tocopherol acetate' under the trade name of Ephyнал 'Roche'.

Rats fed on diets deficient in vitamin E are unable to bear normal young; they absorb the foetus during gestation. Exhibition of 2 mg. of Ephyнал shortly before or just after impregnation was sufficient to prevent abortion and normal young was born. Lack of vitamin E in male animals brings about degeneration of genital epithelium which leads to oligospermia, azoöspemia and finally to complete sterility. Favourable results have followed administration of vitamin E to women who have previously had miscarriage or premature birth from no accountable cause and in many cases they gave birth to normal children. Formerly clinicians used to rely on concentrate of vitamin E. Synthetic vitamin E in the shape of Ephyнал 'Roche' now makes accurate and extensive clinical investigation possible. Ephyнал is indicated in cases of habitual abortion, premature and still-births occurring without discoverable cause. Threatened abortion, uterine contraction and hæmorrhage in the early stage of pregnancy have also been averted in some cases. Certain conditions of sexual underdevelopment and the sterility, delayed menarche, oligo- and amenorrhœa associated therewith are benefited by Ephyнал, which not only ensures development of embryo during pregnancy but also normal growth and function in the new-born. Owing to its favourable action on male reproductive organs Ephyнал is recommended in impotence. Dosage is usually 1 to 2 gm. of vitamin E for the entire pregnancy or 1 to 2 tablets of Ephyнал daily. In case of threatened abortion the dose may be increased from 5 to 10 times this quantity and continued for a week or two.

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